

"The Scream"

A wake-up call after armed art robbery

Also inside:

- Statoil taps into Barents Sea
- Haier aiming higher
- European yards building a future
- Risk Based Certification takes off with Korean Air



3 Editorial:
Meeting new challenges with fresh ideas

4 Risk Based Certification takes off with
Korean Air



8 Huf brings intelligence to car security

11 Galileo in motion

14 Haier aiming higher

16 Tara Mine: Mining for excellence



18 isrs⁷: Incorporating industry best
practice

21 "The Scream":
A wake-up call on security after armed
art robbery

24 European yards build a future



28 Tor Svensen shares his thoughts on
common rules

30 Statoil: A new player in a new market

32 Exploring the Barents Sea

34 PGN optimises its pipeline management

36 News

38 Last Word: At the coal face

**DNV Forum is the
corporate magazine
of Det Norske Veritas**

PUBLISHED BY
Corporate Communications
N-1322 Høvik, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 91 60

EDITOR
Stuart D. Brewer
Tel: +47 67 57 85 11
Mobile: +47 915 22 360
Stuart.D.Brewer@dnv.com

ADMINISTRATION
Gro Huseby
Tel. +47 67 57 86 01
Gro.Huseby@dnv.com

DESIGN
DRD DM, Reklame & Design as

PRINT
Stens Trykkeri

COVER PHOTO
Courtesy of Munch museum

No responsibility is accepted by the
publishers for statements made by
authors, nor for attributable comment.
Reproduction permitted with
acknowledgement of source.

© Det Norske Veritas 2004

DNV (Det Norske Veritas) is an
independent, autonomous Foundation
working to safeguard life, property and
the environment. DNV comprises
300 offices in 100 countries, with 5,800
employees.

VISIT OUR WEBSITE WWW.DNV.COM

Meeting new challenges with fresh ideas

Over the past decade, the international business community has faced ever-stricter regulations established to safeguard the environment, security and the health and safety of employees. More and more companies recognise the value of ensuring quality operations and efficiency. DNV is playing an important role in this process by providing businesses with the tools to manage risk.

Risk Based Certification

In this issue of *DNV Forum* we take a closer look at DNV Certification and the development of an innovative risk management approach - Risk Based Certification. The introduction of Risk Based Certification represents a vitalisation of management system certification that has been applauded by both accreditation bodies and key customers, including Korean Air. Read more about this new way of delivering accredited management system certification on p. 4-7.

Meanwhile, DNV Maritime's share of the world fleet is holding at 16.5 per cent, while the organisations share of the total order book is estimated to be 18 per cent - representing 24 million gross tons. As the world's shipbuilders welcome the dramatic turnaround in their industry's fortunes, shipowners are increasingly turning to quality European shipbuilding capacity to meet demand for new tonnage. Our report on p. 24-27 in this issue of *DNV Forum* offers an insight into this development.

In the area of DNV Technology Services, a large portion of DNV's North Sea activities are focusing on the operational phase of the oil and gas fields. At the same time, competence and technologies developed in the

North Sea represent key elements in our international expansion. Perusahaan Gas Negara, the Indonesian national gas transportation and supply company, has turned to DNV in order to optimise its pipeline management. Read more on p. 34-25.

Sharing our expertise with new markets

DNV Consulting continues to provide unique services to large industry players. As an example, a joint industry project has been established to create the world's best system for improving safety, environmental and business performance. Dubbed isrs7, you can read more about this new system on p. 18-20.

In a rather unique assignment, DNV Consulting has also been asked by the Oslo municipality to perform an analysis of the world famous Munch museum's security measures in the aftermath of the first-ever armed art robbery in Norway. Read more about how DNV has responded on p. 21-23.

At DNV, we recognise that risk management is becoming increasingly important for companies across all industries, which is why we remain committed to developing our core competences to identify, assess and advise on how best to manage technical and business risks. By providing business with tools to manage risk, we strive to help our customers maintain a safe and sustainable business today - and tomorrow.

We hope you will find the articles in this issue of *DNV Forum* interesting and useful.

Tore Høifødt



Tore Høifødt, senior vice president and head of corporate communications

“Risk management is becoming increasingly important for companies across all industries”

Tailor-made partnership

Risk Based Certification™ is DNV's new way of delivering accredited management system certification. It means focusing audits on identified risk areas in addition to the regular requirements. "We are the first to take steps towards tailor made certification audits and reporting in the world," says Henrik Madsen, COO of DNV Certification. →





"Risk Based Certification
takes-off with Korean Air."

Photo: Courtesy of Korean Air



Henrik Madsen, COO of DNV Certification, is taking a lot of risk with Risk Based Certification.
"This will be our major push for many years. We have to succeed!"

Risk Based Certification is not a replacement for accredited certification, but a different approach in delivering the service. The end result of the certification process may still be a ticket-to-trade. However, DNV's new risk-based approach offers more.

"We will ask our customers to tell us what their most important business processes are because they know this best. Then, after discussions to identify the specifics and agree on the approach, we tailor the audit to focus especially on these identified processes. This goes beyond compliance to any standard, but is vital in assisting the business to identify key improvement areas," says Henrik Madsen, COO of DNV Certification.

An important part of the process is also the post-audit briefing, where the auditor provides direct feedback on the key issues. The feedback is summarised in a report and left with the customer. During the periodic audits and re-certification processes customers can focus on new issues, accommodating possible changes in priorities.

A vital change for certification

The certification business has shown signs of maturing in certain markets. Customers that have gained a high level of competency now expect more value from their certification partners. Henrik Madsen claims that a change in the certification process is of vital importance to move the business beyond compliance verification.

"This is almost a life and death question, I believe, for the industry. We must renew the certification process and offer real value to our customers. We cannot continue to perform the way we as an industry have in the past. I believe that the whole certification industry will benefit from this new approach, and indeed the feedback from the International Accreditation Forum (IAF) has been positive. It is very possible, therefore, that this way of doing things will develop and be added into the standards themselves in time," says Madsen.



Young-Keun Kim of DNV Certification in Seoul offered the first risk based certification audit to Korean Airlines in November 2004.

Great strides

DNV Certification has mobilised the whole organisation to be able to deliver risk based certification. Everyone in the organisation, close to 2,500 auditors, sub-contractors and support staff around the world, has gone through the training program. In addition reporting formats have been updated and aligned in every market.

“Our entire staff has gone through the exact same training. This ensures a common understanding across all our offices. We have also used this process to go from 20 report formats to one standard, which is a fantastic improvement. This helps ensure that the same service is delivered worldwide. We have also started a monitoring process, where we will review and analyze 500 reports over the next six months for quality and consistence,” says Madsen.

Take-off with Korean Airlines

In Korea, the first customers have already been certified based on this new methodology. Korean Airlines has been certified by DNV for years. During the audit in late October of this year, the customer asked DNV to focus on two particular areas in addition to those normally covered by the ISO 14000 standard.

Young-Keun Kim of DNV Certification in Seoul explains that Korean Airlines’ focus areas were the supplier control process and environmental awareness and training. The company believes that environmental awareness and training are essential to implement its environmental management system. How its suppliers handle waste and act in relation to environmental issues are also important.

“What’s new about this is that we as an auditing team follow up more than we would through an ordinary audit,” says Y. K. Kim. “In advance, we ask the customer’s managers to specify some areas to be focused on. Together with the customer, we dive into all types of problems

within the elected area. Finally, we summarise the auditing team’s findings and hand over the report to the customer for further action.”

For Korean Airline, which has outsourced its ticketing service and parts of its maintenance work, it is important to ensure that these tasks are carried out in line with the airline’s policy.

“Through our findings, we concluded that there were some gaps to close – gaps that would not have been discovered without the new risk based certification regime,” explains Y. K. Kim. “For example, the training sessions at the customer’s head office are good, while those held at most of the local offices should be better.”

Korean Airlines’ comments on this new way of conducting the audit have been very positive. DNV is a neutral third party that has a better opportunity to identify risk and have a wider focus than the ISO regime alone.

Managing risk

The goal that all DNV’s services have in common is to manage risk. It was therefore only natural that DNV Certification would be the first to use this approach in Certification.

“I think the risk approach is in our blood throughout the organisation and a part of our way of thinking. Being the first is not unusual for DNV, and we are glad that we now have this opportunity to move forward with something new,” says Madsen.

DNV’s main vision is to be the customers’ first choice in services for managing risk. Time will show if customers go for Risk Based Certification.

Anders Øvreberg/Per Wiggo Richardsen

Bringing intelligence to car security

Huf is one of the main suppliers in the world in the Car Access, Security and Immobilization (CASIM) segment. They make the first things you touch on a car, such as the door handles, the keys and the ignition. As a first tier supplier in the international auto industry, certification is a must, but Huf can't afford to be satisfied with just a framed piece of paper on the wall.

Huf Hülbeck & Fürst GmbH & Co. KG, began as a small family owned company that started making locks and keys back in 1908. When the auto industry in Germany took off, they realised that cars needed locks too, and supplied their first car key to Mercedes in 1920. This ability to adapt has stayed with the company, and the Huf name can now be found on many sets of car keys around the world.

“One of the most important success factors for Huf has been our ability to remain technology leaders within our segment,” says Dr. Dieter Kopperschläger, Executive Vice President of the Huf Group. “Huf has managed to change from a purely mechanical company to a company that is able to produce high level 'mechatronic' products, which integrate electronics and mechanical products. And electronics makes all the difference in car security today.”

For example, a leading Huf mechatronic product is the push-button start of the new BMW 1-series. In fact, Huf delivers the entire car access, security and immobilisation system for the series.

Required certification

The automotive industry is a fiercely competitive business. To ensure quality, certification is not optional but a mandatory requirement if delivering parts to the automotive industry. The certification required is to the automotive specific ISO/TS 16949 standard. It covers a comprehensive quality system for automotive industry manufacturing suppliers.

“To be able to hang an ISO/TS 16949 certificate on the wall is no great advantage, except as a ticket to trade. But if you closely consider and understand what is written in the TS, and apply these ideas and rules to your production, then benefits come. Then you can improve your work processes and handle the demands



I don't think there is another company in the world that can cover all the interfaces and components of a complete car access, security and immobilization (CASIM) system. Maybe if you put five or six other companies together, can they match our product variety and capability,” says Dr. Dieter Kopperschläger, Executive Vice President of the Huf Group in Germany.



Photo: Courtesy of Huf

for continuous improvement, as well as increase quality and control costs,” says Dr. Kopperschläger.

He underlines that anyone working to be certified should “make sure the application of these standards make you successful, and that you are not doing it for the certification itself.”

A demanding but rewarding process

Huf made the decision to go for ISO/TS 16949 in September 2003. At this time a new version of the standard had been issued, incorporating many of the requirements in ISO9001:2000, and their previous certifications were expiring.

“One of the advantages of the second edition ISO/TS16949 is that you basically only have to deal with one quality standard,” explains Dr. Kopperschläger. “Therefore we decided to make a complete re-certification. It was in the beginning of February 2003 that we made the decision to go for DNV as a partner, and in September 2003 we passed the audit for the headquarters and another design location in Munich.” In the process of getting certified, Huf integrated 46 project teams, set up 38 process owners, integrated 420 documents, completed 265 process flowcharts, and made 83 overviews of processes.

“It was a lot of work,” laughs Dr. Kopperschläger, “but the process really has given us a completely

Huf delivers the entire car access, security and immobilisation system for the new BMW 1series: lockset, doorhandle, emblem tailgate handle, startstop button and key insert box.

new way of looking at our production.” A computer tool called ARIS collects and provides all this information on the company intranet, for all group members and employees to access at any time. →



Huf workers on the production line



Photo: Courtesy of Huf

An international family

Huf's current leading position was not just secured being a technology leader. The company made a decision as early as in 1983 to go global, and established the first German venture in Spain.

"We have now followed an international strategy for more than 20 years. In fact, in most countries we were the first for our product range, and that is a big advantage for us. Now we have 10 members in the Huf Group spread on three continents, with the youngest member being in Poland," says Dr. Kopperschläger.

Huf has more than 5000 employees around the world, although most of these can be found at the company's headquarters in Velbert in Germany.

An international partner

Running a widespread international company places extra importance on corporate best

practices and corporate rules. Ensuring that the customers are offered the same quality in every market is crucial, and a concern for Huf as well.

"We needed someone who could help us in rolling out the TS Certification around the world. Otherwise, we may have run the danger of a Huf Group member getting a TS Certificate that is not valid. DNV could prove intense knowledge regarding the content of the TS Certification. DNV could also assist in rollout of the certification to the other members of the Huf Group, as DNV is located in all the countries where we are represented. This made all the difference," says Dr. Kopperschläger.

Technological competence and hard work have proven yet again to be gold for the Huf Group, who brings intelligence not just to cars but to the certification process as well.

Anders Øvreberg

Galileo – Certification is set in motion

The Galileo satellite navigation system – the European counterpart to the US Global Positioning System GPS – is at its developing stage using the utmost of technology. DNV is currently chosen to study a Galileo certification regime. →





Since ancient times, people have looked to the stars to find their way. Today, satellite navigation is continuing this tradition, offering users instantaneous and a highly accurate way to establish their position.

system over a 20 years period will be about 74 billion Euro. During this period, Galileo will enable a broad range of everyday applications and by some estimates, create more than 100 000 new jobs.



"A certification scheme was seen to be a competitive edge to meet all the demands and to ensure the swift introduction of Galileo in the presence of GPS," says technical officer in charge of Galileo certification, Eric Chatre.

As new technologies enable new products and services, it will become increasingly necessary for individuals to ascertain their precise position in space and time. And before long, the Galileo satellite radio navigation system will become an integral part of the everyday life of Europeans. Indeed, the system will be used in mobile phones, air traffic management, car and maritime navigation, public services, safety and environmental management, and many other applications.

Satellite navigation is advanced technology originally developed for military purposes. Now commercially available, this technology enables anyone to instantly and accurately determine their position in time and space, so long as they have access to a receiver capable of picking up signals emitted by a constellation of satellites.

Today, satellite navigation users in Europe have no other alternative than to utilise GPS or GLONASS, satellite systems operated by the US and Russian military. About 15 years ago, the EU saw the need for Europe to have its own system – one independent but compatible with the GPS system. Galileo will be under civil administration.

The 30 Galileo satellites will provide global coverage and cost about 3.2 billion Euro to deploy. However, advocates estimate the total commercial benefits of the

Certification regime

It was early recognised that the process should be guided by an appropriate certification regime to build confidence among service providers and Galileo users that the system could be used in safety critical applications.

"A certification regime was seen to be a competitive edge to meet market demands and to ensure a swift introduction of Galileo in the presence of GPS," says technical officer in charge of Galileo certification activities, Eric Chatre. "Standards and certification are key to Galileo market penetration."

Given its overall objective of safeguarding life, property and the environment, combined with its certification expertise, DNV was eager to contribute to the Galileo project, says Narve Mjøes, head of DNV Space Activity.

A consortium was set up to address the standardisation and certification issues. DNV was chosen to lead the certification related part of the project, and last year the recommendations were presented to the European Commission, the European Space Agency (ESA) and the industry.

"Galileo is a complex system with a long lifetime targeting a multiple community of users," Chatre says. "With so many parties involved, there were many challenges, but no unexpected ones."

The main challenges are the establishment of an adequate certification organisation with sufficient independence and the elaboration of suitable requirements.



Galileo – the European counterpart to the US Global Positioning System GPS will be operating from 2008.

Together with the rest of the consortium, which consisted of Airbus, Alcatel, Isoscope, German Aerospace Center, Thales and European Satellite Services Provider, DNV was awarded a new contract to further develop the certification scheme towards local augmentation systems and the applications “air” and “sea”. Kick-off for this project was in January 2004.

“Then the next stage will be the implementation phase,” says Eric Chatre.

Eva Halvorsen

Illustration: Courtesy of Galileo

GALILEO – THE EUROPEAN SATELLITE NAVIGATION SYSTEM

- Core constellation of 30 satellites with global coverage by 2008, will cost an estimated 3.2 bill Euro.
- Satellites broadcast signals which are used by a receiver to determine its position
- Key component of new transport infrastructure and information infrastructure
- For commercial, safety, security and governmental applications
- Under international civil control
- Total benefits over a 20 year period are estimated to be 74 billion Euro
- Galileo represents the largest IT project in Europe, creating more than 100,000 new jobs

Aiming higher

In its 20 year history, the home appliances produced by the Chinese company Haier has made it a household name. With a market share exceeding giants such as General Electric and Bosch-Siemens, Haier is now increasingly recognised worldwide. Crucial to Haier's success has been its quality work.



CEO Zhang Ruimin: "In the past 20 years Haier has constantly accumulated experiences, and gradually formed its own development and operation outlook focusing on consumers."

In the mid-1980s production at the recently completed Haier factory in Qingdao suffered from quality problems. The common belief among employees seemed to be that substandard products could simply be sold at a discount. The employees were eligible for those discounts and the incentives for making perfect products were somewhat weak. It all ended with a bang.

This defining moment in the Chinese home appliance maker's history occurred when its CEO, Mr. Zhang, ordered the destruction of some 70 defective washing machines straight from the assembly line. For the stunned employees watching the incident, the message was painfully clear: Substandard products have no place in Haier.

Times have changed

Today, Haier is on Forbes' Magazine's top hundred list of the world's most recognised brands. In Manhattan, Haier is a powerful symbol of success with its own landmark building, The Haier Mansion. Haier is the most valuable brand in China, yet the company has ambitious plans. In what has become a Chinese business trademark, it has an almost unbelievable annual growth rate -- revenues have surged 70 per cent annually and the company earned almost USD 10 billion in 2003.

Last year, Haier was the world's second largest producer of household electric appliances after Whirlpool, followed by General Electrics and Bosch-Siemens, companies that have been around for up to a century.



How does a company accomplish such achievements?

Everyone at Haier will say that the key to their success is uncompromising quality standards. Haier's Quality Manager Liu Xiangyang says, "The first seven years we were working very hard with quality improvement, getting the basics right. We did not expand further until several quality parameters were met. Then, a milestone was reached when the 400 different standards that applied to our operations were reviewed and cut back to just a few. We decided to adopt ISO 9001 standards, which form a basic foundation for quality across all aspects of our operations. This initiative also gave us all a common language and understanding, making it easier to communicate about our quality improvement work."

He continues: "We opted for certification of our quality management system to the ISO 9001 standard in part because we believed we needed a quality management system that was more suitable for international operations."

When we got our first certificate in 1996 it gave us a chance to get an overview of our



In its efforts to succeed worldwide, the Chinese home appliance maker Haier demonstrates that the foundation of a strong brand is quality – not only in the products, but the continuous improvement in everything it does – from after sales service to the processes and management systems.

status. From then on, we worked on improvements in particular areas. And in 1995 we entered the world market, confident that we had what we needed.”

According to Xiangyang, the decisive factors in choosing DNV for the certification of the quality management system were its long international history, professional auditors that were keen to deliver quality and customer oriented services. He adds, “DNV is a good partner for continuous improvement work that goes beyond the ISO standards work.”

Drawing business development ideas from the continual improvement work

“The certification helped us work with quality in a broader sense. It is not something that applies exclusively to our end products. When we looked at our processes and looked for trends that needed attention, we noticed several things that we were able to directly translate into business opportunities. For instance, when we saw a slump in sales of washing machines during the summer, we introduced a smaller, lighter and less electricity- and water-consuming machine. It became so popular that we now sell more washing machines in China

in the summer than in any other period.” When reviewing their after sales processes, Haier recognised the potential for improvements and soon after became the best company in China with regard to service, delivery and general customer service. Seizing that opportunity quickly put Haier ahead in the Chinese market. Haier’s growth philosophy is to always have a strong foundation before seeking steady growth, a strategy that has enabled Haier to achieve sustainable growth.

Going the other way

At present there is a lot of talk about offshoring and western companies outsourcing manufacturing work to China. By contrast, Haier has added factories in the USA and Pakistan, bringing their total number of international facilities up to 22.

When asked about the impact of China’s entrance into the World Trade Organization, Liu Xiangyang is excited to have the opportunity to compete in the international markets on a more even field. However, he acknowledges that it will be a challenge. “It is a bit like going from local championships to the Olympics,” he laughs.

Unlike the Olympics, win-win situations are possible. Recently, the Japanese electronics company Sanyo signed a comprehensive alliance with Haier. Sanyo is now building a USD 30 million factory in Qingdao to make compressors for Haier’s home appliances. And Sanyo will use Haier’s sales network to market its digital products in China. Similar agreements will create opportunities for Haier abroad, while the company will continue to attract more business to the Chinese market.

But for Haier, thinking big comes natural. While China is a vast market, Haier will continue to work its way onto the international markets, so don’t be surprised if a Haier product comes to a kitchen or bathroom near you.



Haier’s
Quality Manager
Liu Xiangyang

Kristian Lindøe

Mining for Excellence

Today, Tara Mine is performing extremely well, both in terms of productivity and in Health and Safety management. But according to Tara Mine's managing director Eero Laatio, it wasn't always such a positive picture.



Located just outside of the town of Navan in the county of Meath, Ireland, the New Boliden's Tara Mine mine employs around 650 people (supported by a contracted workforce), producing around 2.6 million tones of zinc per year, in addition to some smaller amounts of silver. Zinc production figures are on target, newly explored ore-bodies show great promise. And earlier this year, the mine was awarded a Level 6 ISRS (International Safety Rating System) rating by DNV Consulting UK.

This success represents a great improvement over the past. "Not long ago, both production and safety performances gave great cause for concern," says Boliden Tara Mine's managing director Eero Laatio. "Our performance was unacceptable, and something had to change." The mine's management sought an organisation and safety system that could support their change process, and after some deliberation chose DNV and the ISRS.

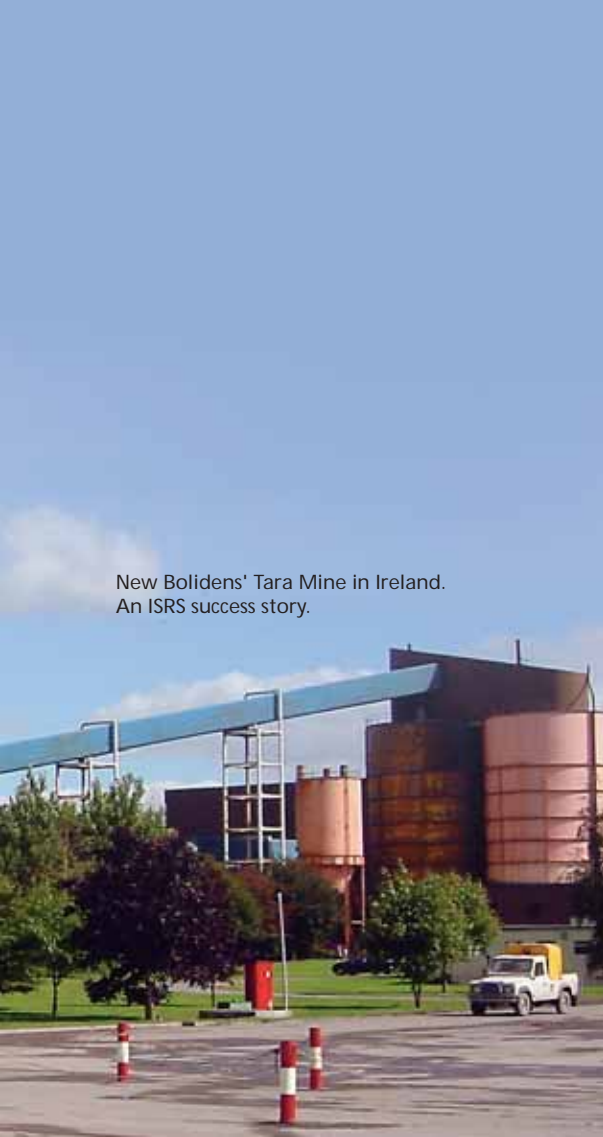
Mine Safety Superintendent John Grennan recalls safety statistics from that period and reflects on why they chose the ISRS. "In 1999 we had 62 lost time accidents, and in 2000 we had a further 23 – despite being closed for a five month period," he

says. "We needed structure and direction, and we have got that from the ISRS and DNV."

In 2000, management took the brave step of closing down operations for five months to conduct some significant engineering upgrades and to reassess strategy and operating processes. "We realised it was time to start with a fresh perspective," says Mr Laatio. "The mine was shut-down and the price of zinc crashed, it was not a pleasant picture."

The need for engineering enhancements, coupled with industrial unrest and poor safety performance was crippling the operation. Getting the mine back into productivity was not an easy process, but the ISRS was a key enabler in the delivery of business objectives. "We had our baseline ISRS audit in 2000 and achieved a Level 1," says John Grennan, "but our management quickly realised that the DNV report was providing us with a route map to improvement."

The mine embarked on a programme of training, systems development and implementation. John Grennan and his safety team, a committed leadership, with the full support of the mine's



New Bolidens' Tara Mine in Ireland.
An ISRS success story.

SAFETY STATISTICS

Statistics from Tara Mine.

"You can see the effects of the ISRS System beginning in 2002," says Nick Jackson.

	Frequency	Loss Time Accidents
January - June 2001	20.9	12
January - June 2002	17.5	5
January - June 2003	13.5	8
January - June 2004	1.7	1
2001 (Total)	24.3	26
2002 (Total)	26.1	21
2003 (Total)	15.2	18

employees and safety representatives have all contributed significantly to a period of sound improvement. As the mine's performance improved, incidences of lost-time accidents were reduced. In 2002, there were 21, in 2003 there were 18, and by the end of August 2004, the mine had recorded only 3 lost-time accidents for the year.

The significance of these improvements is well appreciated by the mine management. "We achieved an ISRS Level 5 in 2003, and a Level 6 this year," says Mr Laatio. "As our ISRS performance increases, our accidents decrease. This impacts positively on both safety and business performance. Our leadership team now embraces the ISRS as our process for managing risk. Our employees recognise the system is there for their benefit and actively participate in risk assessments, inspections, and other loss control activities. While we did have systems in place previously, we couldn't benchmark results. The ISRS has given us direction, structure and visible improvement goals."

DNV Consultants Steve Rhodes, Glenn Corr, Nick Jackson and Willie Hamilton have become

familiar figures at the Tara Mine and Nick Jackson is very impressed with the mine's performance. "The system is very inclusive, senior managers; line supervisors and employees all contribute," he says. "The element champions are enthusiasts, the leaders are committed and the safety team hugely supportive. Their risk management activities are well structured, in places innovative (the mine has developed an IT system called AIRS (Accident Incident Reporting System) to measure the performance by way of tracking and closing out hazards identified on inspections and accident/incidents), and well implemented, there is no reason at all why Tara Mine cannot achieve even higher levels of ISRS recognition."

The ISRS Level 5 and Level 6 certificates hang prominently on Eero Laatio's office wall. His secretary Margaret Johnston gave hint to the mine's ambitions. "I've left space for two more certificates," she says.



John Grennan (left) and Eero Laatio and the space on the wall for the 'next two' certificates



BACKGROUND:

Organisations today are faced with a fundamentally new and more complex risk reality. The tolerance for mistakes is being lowered among regulators, consumers and society at large. There is a need not only to achieve operational efficiency, but also to provide assurance of management control to create confidence among stakeholders. A joint industry project has been established between DNV and industry partners to meet this need. The ambition of the project is to create the world's best system for improving safety, environmental and business performance. The system is isrs², based on the long established International Safety Rating System (ISRS).



isrs⁷: Incorporating industry best practice

A joint industry project has been established to create the world's best system for improving safety, environmental and business performance. The new system, isrs⁷, draws on the work of experts from DNV and the nuclear, chemical and petrochemicals industries worldwide. isrs⁷ is based on the long established International Safety Rating System (ISRS).

The driving force behind the project is to develop a system that exceeds the expectations of organisation's stakeholders. At a senior management level, there is an increasing need to demonstrate a management system to control risks is in place, and, moreover, to demonstrate the business performance of the organisation. There is also a need to test existing systems and to comply with international standards for safety, quality and environmental management.

All managers want a system that is simple and easy to implement; a system that is motivational and promotes positive change. Shareholders and investors expect demonstration of a solid platform for future growth, assurance of management control and that Corporate Social Responsibility (CSR) is considered and acted upon.

Experience shows it is hard to drive business improvement through an integrated approach and find effective ways of providing assurance to all stakeholders unless one system can ensure all the various standards are complied to.

Scrutinised by industry experts

The first phase of the project involved a series of listening to customer seminars to solicit views of interested organisations in Asia, Europe, Scandinavia and the USA. Clients were invited to suggest content and review the isrs⁷ prototypes. Their views were actively used in the development process and vital to the success of the project. →



Project manager, Chris Urwin, DNV Consulting says "Developing isrs⁷ in cooperation with industry experts means that the final system will incorporate industry best practice. The 15 isrs⁷ processes from Leadership through to Results and Review, describe all the activities to successfully manage risk and drive continual improvement. It is an excellent system to assure the health of an organisation's business processes."

"Two pilot audits using isrs⁷ have been conducted at the British Nuclear Group's Calder Hall site at Sellafield, Cumbria and Sizewell A, Suffolk. Senior management and process owners scrutinised isrs⁷. The results reported are extremely encouraging and positive," says project manager Chris Urwin, DNV Consulting.

Based on the input from the audits, further enhancements will be made to the system, and it will be available Spring 2005.

ISRS over the years

DNV's International Safety Rating System (ISRS) has been the foundation for developing and measuring management systems. A management system is a framework of controls for managing health, safety, environmental, quality and other business risks, which focuses upon continual improvement and involves a series of interconnected control activities. ISRS is not a management system itself; it is a system which helps organisations establish, develop and improve management systems.

ISRS was first developed in 1976. Over the years, it has been regularly updated with the last edition, Edition 6, developed in 1994. Having fundamentally changed health and safety management practice across industry worldwide, ISRS has been introduced to thousands of client sites and many organisations have used ISRS as the basis for their own systems. The ongoing success of ISRS over quarter of a century is testimony to its sound vision and principles. To bring ISRS up-to-date in terms of management system thinking, and to realise the joint industry project's ambition of creating the world's best system, isrs⁷ was born.

Joyce Dalgarno

Why isrs⁷?

isrs⁷ includes all requirements for:

- ISO 9000:2000 – Quality Management
- ISO 14000 – Environmental Management
- OHSAS 18001 – Health and Safety Management
- PAS 55 – Asset Management
- Global Reporting Initiative 2004

isrs⁷ is aligned with:

- BS 799 – Information Security
- EFQM

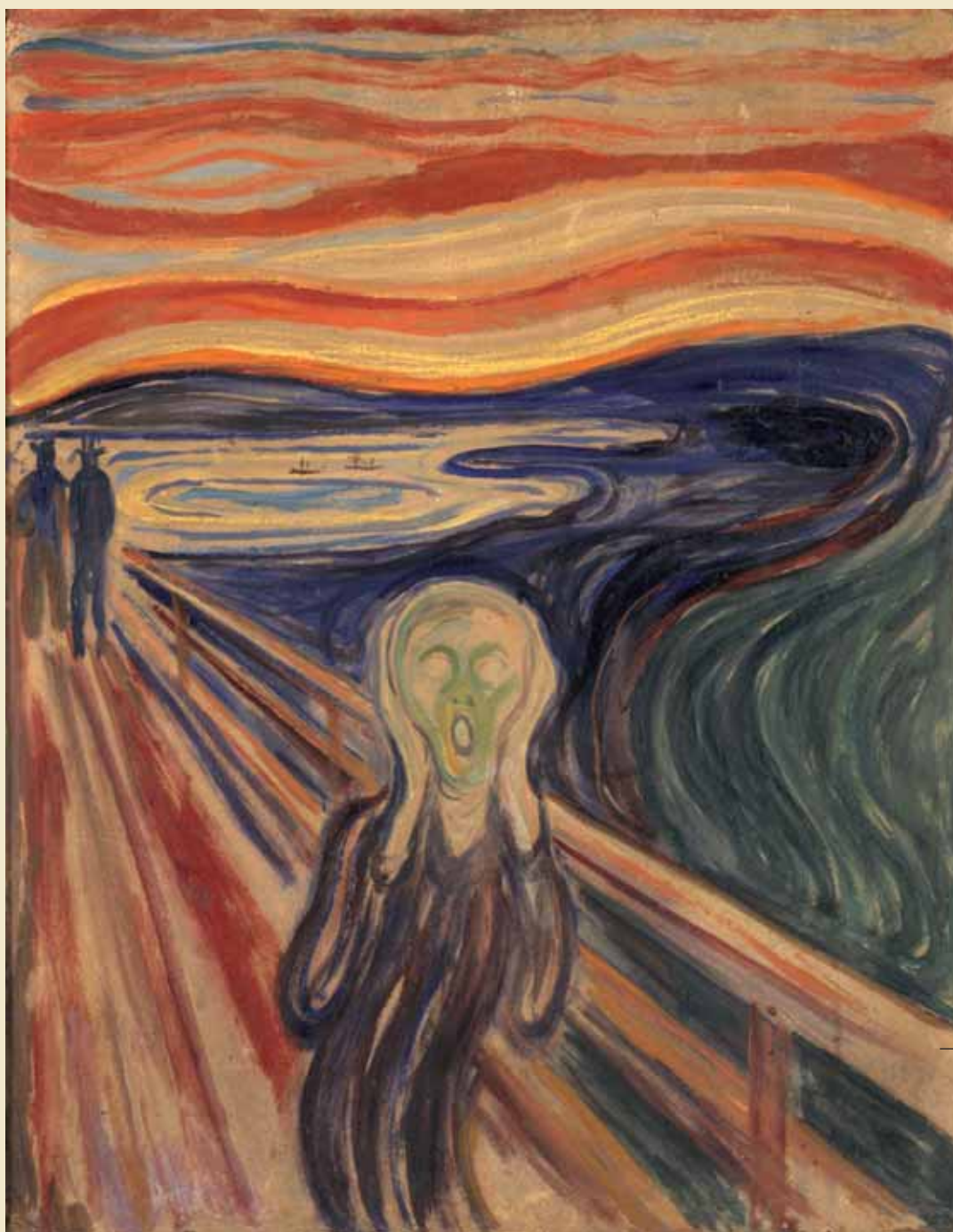
Benefits include:

- Systematic and effective risk control
- Advanced management decision support
- Improved safety, environmental and business performance
- The ability to meet and exceed regulatory requirements
- Optimised work processes using industry best practice
- Quantified goal setting
- Internal and external benchmarking
- Improved personnel behaviour and commitment
- Global co-ordination of performance for international organisations
- Single integrated management system to drive continual improvement

isrs⁷ processes

The tool is comprehensive and detailed. The processes include:

1. Leadership
2. Planning and Organisation
3. Risk Evaluation
4. Human Resources
5. Compliance Assurance
6. Project Management
7. Training and competence
8. Communication and promotion
9. Risk Control
10. Asset Management
11. Contractor Management and Purchasing
12. Emergency Preparedness
13. Learning from events
14. Risk Monitoring
15. Results and review



Edvard Munch's "The Scream" and "Madonna" were stolen from the Munch Museum at 11.10 am on Sunday, August 22. Both paintings are still missing.

“The Scream” robbery – a museum’s nightmare

Two of Edvard Munch’s famous art icons, “The Scream” and “Madonna”, were brutally stolen from the Munch museum in Oslo in August of this year. →



Photo: Scanpix.no

The two armed robbers ran off in disguise carrying the two valuable art treasures.



Photo: Scanpix.no

In broad daylight, on an ordinary Sunday morning, two armed robbers took only a few minutes to steal two of the world's most famous and valuable art treasures. Hidden by a disguise, the two armed men ran through the museum's cafeteria door and threatened two museum guards with a gun in front of 50-70 frightened visitors. After a brief search, they found what they were looking for and tore the irreplaceable paintings down from the walls.

Outside, a third man was waiting in a black Audi A6. The armed men ran towards the car carrying the heavy framed and glass-covered pictures, jumped in and vanished. Shortly thereafter, both the car and frames were found, but no suspects or paintings. The state of the stolen pictures is unknown, causing experts much concern.



Lise Karin Mjøs, Oslo Municipality's director of art collections, is still hoping to get the famous paintings back. Here in front of Munch's wonderful wall-to-wall painting "The Sun" (1909-11).

First armed art robbery in Norway

This is the first time ever an armed art robbery has taken place in Norway. Although thefts similar to the Munch robbery have occurred in Europe and Scandinavia before, this incident robbed Norway of some of its innocence.

In recognition of this new risk reality, DNV was asked by Oslo municipality, which is the Munch museum's owner, to perform an analysis of the Munch museum's security measures relating to fire, burglary and robbery. A multi-disciplinary team from DNV completed its report in November.

First museum analysed by DNV

"This is the first time DNV has performed a security analysis of a museum," says Monica Solem, project manager in DNV. "However, in this case DNV has leaned on its transferable security experiences from the defence, telecom and shipping industries. DNV's broad experience in risk management and assessment according to international standards has also been valuable in this project."

According to the Norwegian police authorities, the Munch robbery has increased the threat level to artworks in Norway. What seemed to be safe enough before the Munch robbery appear not to be so anymore.

All over Europe, the theft of Edvard Munch's masterpieces has stirred considerable debate about how to protect valuable art if thieves are willing to use deadly force to get hold of it. A principal question in this debate has been: What is an acceptable level of security that will guarantee the safety of valuable art while allowing the public to experience artworks without having to peer through thick safety glass, bars and barriers?

Time barrier vital

In order not to reveal the Munch Museum's security measures, the DNV security analysis is confidential. However, the following recommendations have been made public: to install a lockable gate for the general public at some distance from the entrance door, establish a labyrinth in front of the gate, install metal detectors, protect the valuable icons with glass, bolt all artworks onto the walls and further section the rooms where the artworks are stored.

"Armed robbery is a very dangerous and serious situation for both guards and visitors in a museum. That's why sufficient time barriers are so vital in a security system. The only possible way of preventing armed robberies is to discourage the thieves by creating enough time delay so that the police can get there in time," says Solem.

She adds: "At the time of the robbery, there were hardly any barriers to overcome in the museum."

The perception of security

Lise Mjøs is Oslo municipality's director of art collections. She says that an open museum, with easy accessibility to the art pieces, represents a risk that the museum has been aware of. "We believed the museums security level to be better than the findings of DNV analysis. The building was upgraded ten years ago and we were about to install a new surveillance system. In our view, there were other and more urgent challenges, such as the preservation and storage of the artworks."

By letting the paintings stay out in the open day and night, Edvard Munch treated his own paintings rather badly. A hundred years later, many of his masterpieces are crying out for restoration and preservation.

Mjøs continues: "The DNV report, as well as the art robbery itself, has made it quite clear to us that our impression of security was incomplete." In future, the security of the Munch treasures will be assessed according to the risks of fire, robbery and burglary as well as of moisture damage and aging.

An objective consultant

DNV's report contains no references to the costs of the security measures necessary to make the building comply with the new risk reality. However, present estimates of the recommended immediate measures to be implemented by the museum's owner are approaching between NOK 20-50 million. Further measures will bring the estimates considerably higher. The museum will remain closed until next summer in order to implement the immediate recommendations listed in the report.

"Out of the great number of existing consultant companies, we considered DNV to be the most objective and independent," says Mjøs "We have great confidence in the report's contents and we will follow its recommendations."



"The Madonna": Munch thefts robbed Norwegian art society of its innocence.

EDVARD MUNCH

- Edvard Munch (1863-1944) is one of the world's most famous painters.
- "The Scream" was painted by Edvard Munch in 1893.
- "Madonna" was painted by Edvard Munch in 1893-94.
- Munch painted several versions of both "The Scream" and "Madonna".
- Munch bequeathed 1,100 paintings, 15,500 graphical works and six sculptures, among other items to the municipality of Oslo, Norway.
- The Munch Museum opened in 1963, 100 years after Munch's birth.
- An extension of the museum's building was opened in 1994.
- Currently, the Munch Museum has 24,000 works by Munch.
- Munch's pictures are not saleable, but a rough estimate of the value of the collection comes to NOK 20-40 billion.
- The stolen "Scream" and "Madonna" have an estimated value of NOK 650 million.

Ellen Kongsnes



Leading by example: Having built 33 ships aggregating 735,000 cgt and with a contract value of 2.2 bn in 2003, Fincantieri now has 1,365 cgt on order worth a total of 4 bn, of which more than 60% is for export. Vessel types include cruiseships and large ferries, sectors where Fincantieri is a world leader, as well as car carriers and naval vessels.

Photo: Courtesy of Fincantieri

Building a future

Despite lingering concerns over high labour costs, shipowners are increasingly turning to quality European shipbuilding capacity to meet demand for new tonnage.

As the world's shipbuilders welcome the dramatic turnaround in their industry's fortunes, some question whether this is a truly long-term global recovery or merely a temporary phenomenon resulting from extraordinary world trading conditions. For many European shipbuilders, the answer to this question holds the very key to their futures - as one industry insider commented recently: "If European yards can't book contracts in this market, they never will!"

Most of the world's major shipyards are full for at least the next three years and owners wishing to procure tonnage within that period are seeking alternatives in Europe. Yet, with newbuilding prices rising rapidly, some believe European builders still can't compete on costs. Indeed, a quick look at today's orderbook reveals that shipbuilders in western Europe remain relatively marginal players when it comes to mainstream ship construction.

The French are building a couple of gas carriers and a handful of trawlers; the Germans have booked a few more deals, but mostly in former East Germany where labour is still substantially cheaper, and the Italians, led by star performer Fincantieri, are building a mixture of cruise ships, ferries, ro ro's, chemical tankers and research vessels (see also sidebar). The Dutch are currently specialising in various general cargo ship designs and have a few more ships on their books whilst the handful of remaining facilities in the UK are knocking up a couple of logistics vessels, one FPSO and the odd barge or two.

Searching for slots

However, things may be changing. As the executive vice president of Fincantieri's merchant ship business unit, Giovanni Romano, highlighted during a recent interview with *Classification News*, the recovery of the European shipbuilding industry is evident. This, he says, is due to shipowners' searching for slots as Far East yards are unable to ensure deliveries earlier than 2007-2008.

Another advocate of Europe's shipbuilding future is Marjo Tikkakoski, marketing and communications manager for Aker Finnyards, who says regional players are "on the right track when it calls upon European shipyards to expand their leading market positions for top-quality special-purpose shipbuilding and at the same time also retain an effective presence in standard shipbuilding."

Others are encouraged by developments in other parts of Europe. As highlighted in a special Seatrade report in October,

some easterly European yards with comparatively cheap overheads and labour costs are clearly participating in the boom. Poland, for example, is building some 60 ocean-going vessels, including container ships, car carriers, bulkers and LPG carriers. Romania also has a significant book comprising about 20 ships of 650,000 dwt and Ukrainian yards are busy building the only reefers currently on order, for Laskaridis, together with product tankers, container ships and ore carriers. Other yards to watch in the region include facilities in Turkey where yards are currently working on some 50 ships about 420,000 dwt in total.

Busy times

Croatia's Brodsplit, 3 Maj, Trogir and Uljanik are also experiencing busy times. The four yards, all of which are state controlled, have no slots available until the end of 2007. In 2003 the orderbook stood at 16 vessels but, by mid-year 2004, 36 vessels, totalling some 1.35m gt were on order from Croatian yards. The boom in the region's shipbuilding productivity has provided DNV with a steady workload, accounting for about 70 per cent share of all newbuildings ordered from Croatian shipyards.

Yet challenges remain. Analysts point out that European shipyards definitely have a major marketing job on their hands. Whilst many European shipyards may be able to compete with other global builders on sophisticated vessels in a rising market where most other facilities are already full, some analysts question whether or not they compete on productivity and price in the longer run. However, if the earliest delivery available from a South Korean or Japanese yard is late 2007 or first quarter 2008, an almost empty European yard must be capable of competing, at least in the short term.

To generate new interest in the region's beleaguered shipbuilders and an effort to pull together European efforts to drive new deals in the sector, European shipyards have launched several cooperative initiatives. Even the shipyard associations are pooling their resources - earlier this year, the Association of European Shipbuilders and Repairers and the Committee of EU Shipbuilders' Associations got together to form CESA. At the same time, the European 'LeaderSHIP 2015' initiative continues striving to dig out new orders from owners who simply can't get the ships they want from their usual suppliers.

The European Commission, responding to the demands of regional builders seeking to challenge South Korean dominance, proposed a dispute settlement procedure to the World Trade →

Organisation almost two years ago. But the WTO's regulatory wheels turn slowly and the 'temporary defence mechanism' put in place to support both European shipbuilders and equipment suppliers is now set to remain in place until March 2005. This arrangement, approved by the EU in an effort to answer the perceived unfair Far East competition, has been supplemented by raised incentives for research and development aid - up from 10 per cent to 20 per cent. This 'InterSHIP' programme gives European builders a little more breathing space to build capacity to meet demand.

Bulging orders

The new policy appears already to have borne fruit. Facing bulging Far Eastern orderbooks, some owners are clearly attracted by prompt slots in European yards, which enable them to make the most of today's booming freight markets. In the first quarter of this year, European yards booked 1.5m compensated gross tons (cgt) of new business - about 17 per cent of the world total and up from just 7 per cent one year earlier. The primary aim is to win contracts for sophisticated ships where European know-how can aid product innovation and generate closer ties between shipyards and the maritime transport supply system.

While building a niche business is important, Europe's need to compete on a global, long term basis remains a significant challenge. Highly sophisticated vessels were once the preserve of long-established European builders, whilst Asian yards, the Japanese in particular, earned a reputation for turning out competitively priced standard ships. However, today, even the relative newcomer China is building sophisticated vessel types.

The Chinese may be heading the global shipbuilding charge but this should not detract from South Korean builders' current performance. Hyundai Heavy, the world's largest shipbuilder, for example, announced back in June that it had already beaten its 2004 ship contracting target, some five months ahead of schedule, with more contracts pending. The group booked contracts worth more than USD 5.4 bn during the first half of the year, already ahead of its 2004 target by almost USD 1 bn.

Yet many are encouraged by recent developments in Europe. Indeed, Giovanni Romano notes that Europe has significant competitive advantages, for example in the construction of cruiseships, passenger ferries or special-purpose ships and benefit from the high value end of these segments. "The European shipbuilding industry has gradually withdrawn from the construction of vessels of a lower technological content. Instead, European builders are increasingly focusing on complex products with high added value, where price is not the sole competitive factor. This gives Europe as a shipbuilding location, a good basis for holding its own against the global competition."



Giovanni Romano (sitting) executive vice president of Fincantieri's merchant ship business unit. Here with sales director Giorgio Arena

GROWING WITH EUROPE

The European shipbuilding industry has gradually withdrawn from the construction of vessels with a lower technological content, which are now virtually the exclusive domain of the Far East. Instead, European builders are increasingly focusing on complex products with high added value, where price is not the sole competitive factor. Within this context, Fincantieri is focusing its efforts on three main business areas, namely cruise/ferry, merchant and naval vessels.

Here in the merchant business unit, we look to the future with a certain degree of confidence. Although the market for merchant vessels is by no means an easy one, we have succeeded in winning numerous orders; while the orders from Tirrenia follow on from previous work, the orders from Moby and Neptune Lines constitute an expansion of the company's customer base and clearly prove that Fincantieri is competitive. This is further confirmed by our most recent success, which is an order from Finlines in February this year for three vessels, followed by two additional contracts in November for a total of six ropax vessels.

We also believe there are numerous positive factors supporting continued demand for new vessels in the coming years. Besides increasingly ageing vessels (especially those operating in the Mediterranean) and increasingly stringent safety regulations, the drivers for this sector will be the growth in traffic due to the enlargement of the European Union, the liberalisation of short sea shipping in Greece and the commitment of institutional support in favour of short sea shipping in Europe and Italy through the so-called "motorways of the sea" initiative.



European shipbuilding



Marjo Tikkakoski, marketing and communications manager for Aker Finnyards

FINLAND'S FLEXIBILITY

Like other regions in the European shipbuilding industry, the Finnish shipbuilding sector has maintained its global market share in the construction of sophisticated vessels, such as cruise ships. Yet competition from Asian yards has had a dramatic impact on how Finnish yards operate, especially considering the fact that the number of employees at shipbuilding companies is only one third of what it was two decades ago, while the volume of production (as measured by CGT) has remained constant and quality has improved.

To gain market share, Finland has invested significantly in fundamentals like intensive R&D, skilled workers, and modern facilities, designed to ensure a sustainable and profitable future for years to come. The industry has shown tremendous flexibility in its efforts to respond to the rapidly changing business environment and to secure its position as global leader of the industry in many areas.



Goran Cvitanic, sales and design director, Brodosplit

SPLIT LEADS TANKER INNOVATION

The Croatian shipbuilding industry operates in the international market and export orientation is its dominant feature. Its open world market policy has helped it to survive hard times and maintain a high European level of quality and worldwide competitiveness. We attribute these achievements to the highly skilled workforce and strong design teams, who are ready to meet the demand by shipowners and produce high quality 'tailor-made' ships with innovative designs and features, unique performance and extraordinary service characteristics.

Brodosplit is winning a steady stream of new orders. We currently have the country's largest vessels on order, a pair of tankers, and six 65,000 dwt panamax vessels, plus four additions in the pipeline. All the vessels will be DNV-classed and specified with the Ice Class 1A notation.

Also, we are particularly proud of the innovative new series of 49,900 dwt tankers we're building for Concordia Maritime, the tanker arm of the Stena Group. This contract is for four vessels, with options for two more. Dubbed the Stena P-MAX, the DNV-classed ships are similar in concept to Stena's award-winning V-MAX series and are equipped with complete propulsion redundancy, twin screws and twin rudders, making them inherently safer to operate in heavily trafficked areas. The first ship will be delivered in 2005 and we believe the P-MAX will be the safest medium-range tanker ever.



Petar Car, head of sales and projects, Uljanik

ULJANIK LEADING THE RO-RO CHARGE

Croatia's shipbuilders have been spreading their wings, as volume orders in the chemical and product tanker market have been bolstered by a newly competitive position in the ro-ro market.

Not only is the rate of newbuilding activity high, but the new vessels on order are in many cases larger than the standard pure car and truck carriers (PCTC), which have capacities of 6,000 or so cars. HUAL, the vehicle carrier unit in the Oslo-based Leif Höegh, will employ two 7,100-car-capacity new-

buildings on order here in Uljanik once they are delivered in 2007

We recently saw the delivery of *Grande Anversa*, an eighth ro-ro vessel for Grimaldi. Delivery of the 4,300-car capacity ship was achieved just 32 weeks after keel laying. Next summer we will deliver the ninth 38,000gt ro-ro in a series of 11 for the Italian company. We are also working through a four product tanker deal for Novoship, and this again emphasizes our ability to build quality ships on time.

My personal impression is that with *Anversa* we have achieved a great shipbuilder's success, which we were longing for silently only a few years ago. Tomorrow we have to deliver more vessels in a shorter time if we are to continue to be in the driving seat for PCTC newbuilds.



Per Olaf Brett, research project director, DNV

LIGHT AT THE END OF THE TUNNEL

The remarkable rise in shipbuilding capacity in regions with competitive cost advantages has certainly hurt the European shipbuilding sector, and Norway is no exception.

Despite a mini-boom, which was created by attractive tax incentives terminated at end of 2002, the Norwegian shipbuilding industry has seen a historical 70 percent decrease in orders, based on gross tonnage and revenue in 2003. This sharp decline is in part the result of low activity levels in the world oil and gas exploration, which re-

moved important "bread and butter" business for most Norwegian yards. At the same time, the rapid growth of new building-capacity in China, Vietnam, India and other countries further eroded Norway's shipbuilding market share.

However, soaring demand for tonnage and intense competition have driven Norwegian controlled shipbuilding operations to become extremely competitive on delivery times. Today, the opportunity to earn freight rates one to two years earlier than a typical Far East contract has certainly encouraged shipowners to look to North Europe for new tonnage. Indeed, most of the Norwegian yards now compete with offerings from all over the world on a wide variety of ship types. If this trend continues, Norway's once proud shipbuilding tradition may soon see better days.

Competing beyond basic safety

The maritime industry is moving towards common rules. "From now on class societies will compete more on service delivery, competence, and additional services tailored for the client," says Tor Svensen, COO of DNV Maritime.

The Joint Tanker Project is nearing completion, and the rule development work is well on schedule for the publication of the new common rule set for structural design of tankers in July 2005.

"We have received a formidable amount of constructive and valuable feedback," says Tor Svensen, COO of DNV Maritime. In fact, more than 3000 comments of both technical and formal nature have come in, and the project team is continuously assessing and responding to the feedback.

"Our ability to deliver a first class new rule standard that will be received positively by all stakeholders is now our highest priority in the final stages of the project," says Tor Svensen. He is convinced that the Joint Tanker Project will set a standard that will have an enduring and positive impact on the industry, and in the long term raise the quality of the world fleet.

Common structural rule standard

Quality, transparency, robustness and consistency have been key words for the project. Although today's individual rules ensure safe ships, the project has been designed to provide a new common rule set, with no competition among the class societies on the basic structural safety standard.

"Our stakeholders demanded more focus on quality and robustness, and we in DNV together with our collaboration partners, decided to use our accumulated knowledge in order to produce a new rule standard that meets industry expectations," says Tor Svensen. One of the results is that class processes will be more transparent and there will no longer be any competition between class societies on the





Tor Svensen, COO of DNV Maritime, is convinced that the Joint Tanker Project in every respect has been a wise step to take: it will raise tanker quality, it will contribute to strengthen the role of class, and at the end of the day it will strengthen DNV's position in the marketplace.

main structural scantlings of the ship. In addition, there will be full consistency between the standards for newbuildings and the standards used for in-service assessment of the structure. As an example, the actual in-service corrosion margins will be known and clearly stated already at the newbuilding stage. All the participants agree that these new elements will in the long term help to raise the quality bar substantially.

Rules relating to structural strength are the main topic in the Joint Tanker Project. Although this is an important part of the classification of a ship, the remaining aspects of class will still be left to the individual class societies, ensuring continued competition between them. From now on competition will be on quality, service delivery, competence, and additional class notations tailored for the clients.

"DNV will still invest in research and development projects to sharpen our competitive edge. We recognise that our most important competitive advantage is the expertise of our staff," says Tor Svensen.

Consistent application

The three class societies DNV, LR and ABS have worked together closely and they all have agreed upon a common text for the new rule set. However, it has been asked how the industry can be certain that the rules will be applied consistently. This concern was a very important aspect of the project from the beginning. Co-ordinated training, harmonized software and common monitoring routines are issues the project team has prioritised to ensure consistency.

"We must strive to ensure that we, as a team of class societies, are able to act fast enough to continuously improve the rules based on industry input. If this turns out to be a slow process, the rules simply aren't as sharp as they should be," says Tor Svensen, emphasising that a common rule secretariat has been established to assess the experience gained and prepare for future updating of the rules.

IACS has initiated a similar project: the Joint Bulker Project for the development of common rules for bulk carriers. IACS has announced that the long-term goal is to achieve one common rule set both for tankers and bulkers.

Class still responsible

Many ask what implications introduction of a common rule set will have on the classification societies' responsibility with regard to ship classification.

"As a classification society, we are still responsible for the rules and how they are complied with throughout the newbuilding process. This is the responsibility for the individual societies and we cannot hide behind a common standard. DNV will introduce the new rules as their own and follow the normal process of rule approval, consulting their technical committees. DNV will still be fully responsible for all the certificates issued. The introduction of common rules does not imply a fragmentation of responsibility," says Tor Svensen.

In fact, he is convinced that harmonisation is a growing trend and that the Joint Tanker Project has been a significant step to take in the process to raise tanker quality, strengthen the role of class, and at strengthen DNV's own position in the marketplace.


Eva Halvorsen

THE JOINT TANKER PROJECT - IN BRIEF

- Background: Players had recognised the need to raise the level of quality and develop common rules with clearly stated goals for safety, reliability and durability.
- Aims at developing a new common rule set for classification of the structure of tankers over 150 metres in length.
- Initiated by DNV, ABS, and Lloyd's Register in 2001.
- An unusual project in that it harmonises existing class rules between the three class societies. Future competition will be on competence and service delivery.
- More than 3,000 comments have been received after the new draft rule set was presented to the industry spring 2004.
- The new rule set will be introduced as standard in July 2005.

New player in a new market

When Norwegian energy giant Statoil decided to enter the LNG transport market, the company stipulated stringent health, safety and environment requirements for its fleet of new LNG vessels. Designed to have a lifetime of at least 25 years, sailing in some of the world's roughest seas, and operated by specially trained highly skilled crews, these vessels represent Statoil's commitment to excellence.



Statoil has stipulated extremely stringent safety and regularity requirements. The fact that the new ships' spherical tanks are painted orange is an important safety measure, especially because there is limited light so far north during the winter months.

N

Norway's state-owned oil company, Statoil, produces more oil and gas and operates more fields on the exposed Norwegian continental shelf than any other company. The 25th anniversary of one of Norway's most productive oil fields, Statfjord, is being celebrated this year. There is no doubt that Statoil passed this test with flying colours - more than four billion barrels of oil have been extracted from the reservoirs so far.

First in the Barents Sea

In 1979, Statoil took its qualifying test as an operator of the marine transportation of crude oil from the Statfjord field. Today, the company is taking another qualifying test. The development of the Snøhvit field, located at 71 degrees north, is the first development in the Barents Sea. It is the first development where natural gas will be cooled to liquid in Norway and also in Europe. The fact that Statoil itself will play an active role in the LNG transport is also new.

"When transporting the Liquefied Natural Gas (LNG), we will utilise the experience we've gained from Statfjord, among other places," explains Trygve Egge, the shipbuilding engineer responsible for the transport from Snøhvit. "The company's original idea 25 years ago was for offshore loading tankers to carry oil to land during a transitional period, while waiting for a pipeline to be built in the future. However, the transitional period ended up being permanent, since the use of ships for transport was both safe and reliable. The technology for operation in harsh environmental conditions became standardised after a while, and the preparations for shipping from Snøhvit are based on these standards."

As the owner of the Navion shipping company, Statoil was a major player in crude-oil freight for a long time. It built an extensive fleet of offshore loaders to transport the oil from the North Sea fields. Although Navion has now been sold, Statoil is still benefiting from the experience and knowledge it developed in this company and through this type of transport.

Thoroughly analysed

Egge notes that the harsh conditions in the region present significant challenges. "The offshore loaders in the North Sea are subject to extensive strains as a result of the tough weather conditions," he says. "Vessels are exposed to complex stresses and to fatigue. The same will be true for the new LNG ships that are to transport liquefied gas from the far north of Norway. For this reason, their hulls have been thoroughly analysed at the design stage. These new ships have approximately five per cent more steel in their hulls than comparable vessels do. We've also made use of the experience we've gained from our floating platforms - for example, we dress exposed welds for additional strength."

Statoil expects to be able to start using ships that can tackle the tough conditions in the North Atlantic for at least 25 years, and for these ships to sail on schedule even in the tough winter season.

"By making stringent demands on the ships themselves, on the yards that build them and on the operators that are going to operate them, our goal is to achieve a high level of regularity," says Steinar Thomassen, Statoil's LNG shipping manager. "Our

customers are dependent on receiving their cargoes on time. Regularity means everything to us."

Both Thomassen and Egge note that this effort has been pioneering work for Statoil. "We've applied our offshore culture, in which health, the environment and safety have always been given top priority. This has been the basis of our cooperation with all those involved, not least the shipping companies with which we work closely. Norwegian shipping company Høegh and Japan's K-Line will train their crews specifically during the period before the trades start. Statoil has clearly signalled a preference for Norwegian officers on board. The seaward approach to the island of Melkøya outside Hammerfest, where there is no sun for two whole months in the middle of winter, is challenging."

Building a fleet

To manage such difficult passages, Statoil has arranged for a fleet of three tugs with a separate escort vessel to be ready by the time the first cargo is to be shipped out, probably in the autumn of 2006. New electronic maps over the area have been prepared and lighthouses and lights are being updated.

A total of 70 LNG cargoes will be shipped out from the new facility each year. Fifty of these will mainly be owned by Statoil. Together with K-Line and Høegh, the company is now building three new LNG ships. These ships will then carry LNG to Cove Point on the USA's north-eastern coast and to Bilbao in Spain. A fourth ship is being built by Høegh for French Total.

A lot of work remains to be carried out on the shore-based facility at Melkøya and on the four ships that are being built at yards in Japan. However, the start of this trade will fit in well with Statoil's entry into this market. "We clearly feel that this will be an important stepping stone for us in the north," says Steinar Thomassen.

Per Wiggo Richardsen



Trygve Egge (left) and Steinar Thomassen says: "Statoil and DNV have always collaborated in a positive way. The offshore loading tankers were developed using expertise from both companies, and the new LNG vessels will also be DNV classed."

Exploring the Barents

Analysts estimate that the Arctic region holds a quarter of the world's oil and gas reserves. The Snøhvit field has made Statoil the technological vanguard in the Barents Sea.



As the first offshore project in the Barents Sea and the first Liquefied Natural Gas (LNG) scheme in Europe, the development of Snøhvit has opened up a completely new area of the Norwegian continental shelf.

One of Statoil's most experienced managers, Henrik Carlsen, is senior vice president for Statoil's Barents Sea operations.

"Viewed overall, the development of Snøhvit involves the application of new technology which will be crucial for Statoil's future, both in the far north and internationally," he says.

So far, a total of 61 wells have been drilled in the Barents Sea in the search for oil. These efforts have mostly uncovered gas reserves, and analysts believe the area shows significant promise. At present, Snøhvit is the only field that has been prepared for commercial production.

Throughout the world, many LNG plants have been developed. But after a ten-year collaboration with the German engineering company Linde, Statoil has developed a cheaper and more energy-efficient solution for Snøhvit than ever seen before. Huge compressors have been built in Italy and have been tested and delivered.

Door-opener to the Barents Sea

While Snøhvit has been the door-opener to the Barents Sea, the search for further reserves has begun.

"Snøhvit represents the first step in an environmentally acceptable and long-term development of an area, where further volumes of oil and gas are likely to be proven," says Carlsen. "We have now started to drill three new exploration wells in the Barents Sea and will know if they prove any additional reserves by spring next year."

Few oil and gas development projects have been subject to more environmental concerns than Snøhvit. Statoil has addressed these issues by developing the world's most environmentally friendly solution. The company's permit application was accompanied by an environmental risk analysis and an emergency response plan for the operation. The wells are designed to result in no discharges to the sea – except for the hole section for surface casing – in other words, the top-most 400 metres.

In October, the Norwegian government invited oil companies to suggest new blocks to be explored, and will accept applications for these blocks before next summer.



Mutual interests: "Russia has giant gas reserves in the Barents Sea and Statoil has LNG experience and market access to the North American market," says Henrik Carlsen, senior vice president for Statoil's Barents Sea commitment.

Sea



Photo: Courtesy of Eiliv Leren, Statoil

Statoil has developed a cheaper and more energy-efficient LNG solution for Snøhvit than ever seen before in the industry. Here the receiving and processing plant on Melkøya island outside Hammerfest in northern Norway.

Frustration and disappointments

“We have experienced frustration and disappointments with dry wells along the way at Snøhvit,” admits Carlsen. “However, we have gained valuable knowledge. The geology in the Barents Sea seems to be different from other parts of the Norwegian continental shelf. We must think in new ways and use new models to trace those hydrocarbons. We realise that we do not understand this geology well enough yet.” Carlsen has initiated substantial research to learn more about this geology.

One of Carlsen’s primary tasks is to develop Statoil’s exploration programme for the Barents Sea. The results obtained from this effort will be used to determine whether or not the process plant at Melkøya should be expanded.

The LNG solution opens up new market opportunities for gas from Norway. Analysts agree that demand for gas will increase significantly in the North American market over the coming years, and Statoil has signed an agreement with the operators of the CovePoint terminal. At present, they are considering whether or not to expand the terminal’s capacity by a factor of three. Statoil supports the initiative, but worry that capacity might exceed Snøhvit’s supply. As a result, gas from the Russian part of the Barents Sea is very interesting.

Cooperation with Russian companies

Norway and Russia have a common border up north Barents Sea. Statoil’s objective is to establish cooperation with Russian companies.

For some time, Russia has been trying to position itself in the Barents Sea in gas development. This effort involves seeking western technology and capital to develop its huge gas reservoirs, especially the giant field of Shtokman. Located 600 kilometres north of Murmansk.

Together with Gazprom and Rosneft, Statoil signed a Memorandum of Understanding (MoU) in September to assess opportunities for developing Shtokman on the basis of gas liquefaction. The agreement covers the development options for the first phase of the gas condensate field, including LNG plant construction, Russian participation in Snøhvit and use of the CovePoint regasification facility for marketing Russian gas to North America.

“Having maintained a representation office in Moscow since 1991, this agreement opens a new chapter in our cooperation with the Russians,” says Carlsen. The Russians have signed MoU’s with other companies as well and hope generate some healthy competition to find the best solutions. “At Statoil, we will do our best to come up with the best concept and solutions,” says Carlsen.

One of the challenges is to find out whether it is possible to transfer a well stream through a 500 km pipeline to land. Statoil will have to use all its expertise in this project.

The next step will then be to look into the possibility of Gazprom and Rosneft investing in Snøhvit.

“Statoil currently has a 33 per cent share of Snøhvit. We may consider to go down to 25 per cent if we in return gain a share in Shtokman,” says Carlsen. However, the company’s priority is to make Shtokman a profitable development. Carlsen notes that the region is home to the toughest environmental regulations in the industry, long transportation distance, rough weather conditions, a water depth of 350 m, drifting sea ice and the risk of icebergs.

“We must prove that we can develop and operate Snøhvit without causing any harm to the environment. Only then can we make an effort to find out whether the environmental legislation really needs to be as strict as it is today,” says Carlsen.

Eva Halvorsen

Optimising Indonesian

Owning and operating 2,739 km of both onshore and offshore pipelines, the Indonesian national gas transportation and supply company, Perusahaan Gas Negara (PGN), turned to DNV six years ago in order to optimise its pipeline management. That was the beginning of a long and fruitful relationship.

PGN grew out of a private Dutch-owned company established in 1859. Today, it is a national public utility enterprise with a duty to develop a pipeline infrastructure for natural gas distribution across the archipelago. The pipelines must be properly maintained in order to transport gas to an array of existing and future consumers, such as households and industry. In 2003,

PGN became a publicly listed enterprise when the Indonesian government divested about 39 per cent of its share in the company.

Two milestone pipeline projects have been completed by PGN in the past few years. First the 536 km Grissik–Duri pipeline in 1998, and second, the 470 km



The pipeline between Sumatra Island and Singapore was completed in 2003. The Indonesian national gas transportation and supply company, Perusahaan Gas Negara (PGN), owns and operates some 3,000 km of pipelines, both onshore and offshore, across the Indonesian archipelago.

pipeline management

Grissik–Singapore pipeline via Batam in 2003. PGN has an almost 60 per cent stake in Transgasindo, which owns and operates two transmission pipelines from South Sumatra to Central Sumatra and Singapore. These strategic pipelines are part of the Indonesian government's grand scheme to create the country's integrated gas transmission system.

Focus on training

From the first day of its relationship with DNV, PGN realised the value of training its staff to be able to fulfil the company's commitments. In 1999 a group of 12 PGN engineers and designers came to DNV's headquarters in Oslo for a three-week training session, focusing on both the basics and the latest innovations in offshore pipeline design. The participants of the 1999 training programme are now senior project managers in PGN.

Though having extensive experience with constructing and operating a wide network of onshore gas pipelines, PGN had identified a need to know more about offshore pipelines as the company will install several offshore gas pipelines in the near future. They requested DNV to conduct a training programme for their key personnel this autumn. The training involved a one-week course in DNV Singapore followed by a one-week design exercise in Oslo. The session ended with a one-week round trip in Asia studying best practices relating to pipeline fabrication, manufacturing and construction.

A few weeks later, 12 representatives of PGN's top management were invited to a training session in Oslo. This was followed by meetings in Italy with pipeline company Saipem and then with Sonsub, a subsea contractor and engineering company. Both Saipem and Sonsub are part of the Italian conglomerate ENI.

Speaking at the training session, project manager M. Napitupulu, the general manager of the strategic business unit M.M. Trijono, and the head of the operations division Triyono Heriyanto said that coming to Oslo was a valuable experience and had taught them a lot. They also felt that such training sessions were very useful for the further development of the company's relationship with DNV.

Acknowledged standard

PGN has decided to use DNV's offshore pipeline standard for all new pipeline designs. Over the years, the DNV pipeline standard has become the world's most acknowledged standard.

Earlier this year, the company signed a contract with DNV regarding the basic design and risk assessment of an off-



Pipeline training at DNV's headquarters: Project manager M. Napitupulu, the general manager of the strategic business unit M.M. Trijono, and the head of the operations division Triyono Heriyanto.

shore gas pipeline. The pipeline will be about 160-km long and stretch from the southern tip of Sumatra to West Java, just east of the Indonesian capital Jakarta.

"DNV will provide basic design, risk-assessment and project-costing activities, giving us sufficient information to invite tenders for procurement contracts for long lead items and later on to hire an engineering, procurement and installation contractor," explains M. Napitupulu.

DNV will carry out the work from its Kuala Lumpur office, where the company has established a team of pipeline engineers with extensive design experience.

Optimism in Indonesia

The recent Indonesian election, held on 5 April 2004 has resulted in a new wave of optimism in this populous country, which has 220 million inhabitants spread over 16,000 islands. A new atmosphere has developed, with optimism and initiative as key words for how the population and industry approach the future. New legislation is expected within the area of environmental protection and pipeline integrity management. This will certainly influence PGN's future, and the company is more optimistic than ever as new licences are expected to be issued in the near future.

Eva Halvorsen

PIPELINE PROJECTS DNV HAS CONDUCTED FOR PGN:

- Pipeline training for PGN staff.
- Verification of the conceptual pipeline design of an offshore gas pipeline from Sumatra to Singapore.
- Risk assessment and project costing of an offshore gas pipeline from Pemping to Singapore.
- Conceptual design verification and project costing of an offshore gas pipeline from Sumatra to Java.
- Risk assessment and basic design of an offshore gas pipeline from Sumatra to Java, phase II.

CEO's whirlwind tour of Asia

In a whirlwind tour of Asia last month, DNV CEO Miklos Konkoly Thege spent a great deal of time in China, where he met with top level management from COSCO and World Wide Shipping.



Miklos Konkoly-Thege, fourth from left, here with senior COSCO officials and DNV's management team.

In Beijing, Miklos Thege met with members of management team of World Wide Shipping with whom he exchanged views about shipping in general and the Chinese shipowners future plans, of which DNV hopes to support.

The following day, the DNV CEO met with senior COSCO officials who expressed their satisfaction with the class society's performance internationally and appreciated the stand it has taken in maintaining high quality performance. Ways in which the two parties can further develop their business relationship were discussed.

Later that same day a working lunch meeting was arranged with the

president of CCS who expressed his views in relation with CCS' cooperation with DNV and the benefits this has brought them. Miklos Konkoly-Thege then traveled to Shanghai where he met senior management from China Shipping Group who again stated their satisfaction with DNV's role in ongoing VLCC newbuilding project where CCS and DNV are jointly involved.

Later that day he met with DNV staff in the Shanghai office which was followed by a meeting with Christos Kanellakis (Chairman of DNV Greek Committee) owner and president of Alpha Tankers and Freighters. This meeting was followed by lunch at the newly built reception hall used by the Mayor of Shanghai

DNV selected "Best verifier"



Einar Telnes

Environmental Finance, a leading monthly publication covering environmental issues on the lending, insurance, investment and trading decisions affecting industry, has awarded DNV as the "best verifier" regarding climate change projects. The award, announced in the magazine's December issue, was based on a poll, where readers were asked to consider the climate change verification suppliers.

Having spent the past seven years preparing for the Kyoto Protocol to enter into force, DNV is now prepared to meet the anticipated market demand to manage compliance with the Protocol. The demand for third party services with regard to climate change projects has been increasing the last years, and DNV has gained valuable experience and competence.

"We are now a world leading player within third party services for climate change issues," says technical director Einar Telnes of DNV Certification.

(For more information on DNV's activities related to Kyoto Protocol, the EU's emissions trading scheme and related issues, please visit our website climatechange.dnv.com)

DNV acquires CoreRatings

CoreRatings is the leading European rating agency for independent investment analyses of corporate responsibility risks. The company takes an investor's view on corporate governance and environmental and social performance, providing services to asset managers, pension funds and companies worldwide.

The acquisition of CoreRatings recognises the need for companies to provide more transparent and reliable information on their own intangible value and material risks.

The combined expertise of DNV and CoreRatings will offer the market a full range of corporate responsibility and governance services, satisfying the call for the measurement of material investment risks.

CoreRatings' methodology provides a comprehensive analysis, taking into account both company risks and opportunities and identifying material issues affecting the business.

"CoreRatings and DNV are ideally suited to meet the market demand for independent assessment and verification of companies' intangible assets," says Henrik Madsen, chief operating officer of DNV Certification.

Anne-Maree O'Connor, managing director of CoreRatings, says: "There are exciting synergies in this relationship: CoreRatings' analysis and DNV's expertise neatly fills the knowledge gap between companies and their investors when linking management performance and intangible value to shareholder value."

DNV completes study on LNG marine releases

DNV has performed a detailed study on the consequences of marine LNG releases. The purpose of the study was to provide an independent, objective and validated analysis of LNG marine events that could be used by all parties to address concerns related to the development of LNG import and export facilities.

Based on advanced computer models and detailed knowledge of the design and operation of LNG ships, DNV predicts smaller hazard zones than those quoted by some previous studies. DNV believes earlier studies did not sufficiently credit the design features of LNG ships and thus used non-credible or overly pessimistic assumptions of rupture-sizes and LNG spill volumes.

The study noted that the historical record of LNG shipping suggests that an accidental large-scale release is unlikely to occur in the foreseeable future of the LNG trade into the USA. The excellent safety record is due to the combination of very robust vessel design (with four to five physical barriers between the cargo and the environment), well executed vessel operations (driven by IMO and global industry standards) and port state precautions (driven by organizations such as the US Coast Guard).

In preparing the study, DNV sought advice and input from a wide and varied range of other organizations, such as the 23 sponsor companies and other research institutes. DNV also consulted with Sandia National Laboratories, which provided useful interaction regarding DNV's approach and assumptions. However, no specific data was provided to DNV by Sandia nor has DNV viewed their report.



Best in Class



DNV reclaimed its crown as 'The Best Classification Society' at the Lloyd's List Awards

At the Lloyd's List Maritime Asia Awards last week, DNV reclaimed its crown as 'The Best Classification Society', fending off Lloyd's Register and Class NK (Nippon Kaiji Kyokai). The event took place at the Grand Hyatt in Hong Kong and DNV's victory is the third time they have won it over the past six years. DNV also picked up the prestigious award in 2000 and 2001.

"The award reflects the standing DNV has in the Asian Market," says Maritime Asia editor Sam Chambers. "To win one of these trophies takes overall high standards of performance - it's about operating safely, efficiently and attending to customer needs."

DNV's Bjorn Haugland (right) accepted the award at the sixth Lloyd's List Maritime Asia Awards ceremony, attended by more than 350 top shipping executives in Hong Kong

Criteria included breadth of offices, number and breadth of ships classed, value added services, customer satisfaction and new ship types entered into at new yards. A double process ensures fair winners - popular voting first by the readership of the Maritime Asia publication, then a panel of independent judges sifts through the three finalists in each category.

The Lloyd's List Maritime Asia Awards are considered by many as an opportunity to recognise the leaders of the Asia maritime industry, whose innovation and dedication to quality have helped to transform Asia into the world's leading maritime region.

DNV celebrates 30 years in Brazil

Thirty years ago, DNV established an office in Rio de Janeiro. Today, DNV's resource base in Brazil includes a total of 300 employees located in seven offices throughout the country.

DNV's Brazilian operation began in 1974, with the opening of an office in Rio de Janeiro, where activities were initially related to ships in operation (SIO) surveys. Later, DNV Brazil established a strong relationship with oil giant Petrobras and expanded its activities in the marine and offshore oil and gas sectors to become the leading management systems certification body in the country, with a market share of 17.7 percent.

DNV has also been active in Brazil's emerging shipbuilding industry, which in the last three years has seen more than 18 offshore supply vessels built to DNV class and more than 50 ships, amounting to 15 percent (GRT) of the Brazilian Fleet.

Since acquiring in 1999 DNV Principia, a leading risk and reliability engineering company, DNV in Brazil has grown exponentially. With further growth in the region expected, DNV is confident that their Brazilian operations will continue to thrive for years to come.



At the coal face



Patrik Wheeler
Editor of Marine
Engineers Review

I was only six-years-old at the time, but I remember October 1973 like it was yesterday. For me, OPEC and the oil embargo that followed the Yom Kippur War meant cold baths, playing Monopoly and Scrabble by candle light; Dad buying a paraffin heater and then hunting around for some paraffin; toasting bread at the fire place, if we were lucky to find some coal; NO TV; and, worse of all... early to bed, early to rise and having to walk to school.

For others it meant queuing, and sometimes fighting at filling stations; signs that read: 'NO GAS HERE'; and for Those in the USA, checking the first number of your car's registration plate to see if it was an odd or an even day on which you could 'fill up'. Dark days, indeed!

Today with the escalating geopolitical crisis in the Middle East, which pundits say is now threatening to spread beyond Iraq to Saudi Arabia, the world's largest exporter of crude oil, together with the unlimited demand for crude oil in China and, to a certain extent India, the oil crisis that looms could dwarf that of the 1970s.

Many believe we have now passed Hubbert's Peak; the theory developed the 1950s which described the basic laws governing the depletion of any finite resource, i.e. production starts at zero and then rises to a peak which can never be surpassed. Once the peak has been passed, production declines until the resource (in this case crude oil) is depleted. By all accounts we have almost plundered the world of this natural source of fuel. The Energy Institute in the UK told me that the world will have completely run out of natural oil and gas by about 2050 - and that's being optimistic, they say.

So what does the future have in store and what will tomorrow's marine diesel engine run on? There is nuclear power of course, but despite environmentalists arguing over many years for a drastic reduction in the use of fossil fuels, they have probably put the kybosh on this

clean energy resource by turning the tide of public opinion against nuclear power through lobbying and demonstrating outside the UK's Sellafield plant and the Faslane naval base - and there's an oxymoron if ever there was one!

There's biomass, which all the main marine engine builders are looking into, and orimulsion continues to be mooted every so often, but what about coal as the energy for the future?

Admittedly a fossil fuel, but if all the coal mines in the UK alone were re-commissioned, there would be enough fuel to propel us through to the 22nd century. Coal can be used to produce liquid fuels suitable for transportation applications by removing its carbon element through pyrolysis or liquefaction. The technology is already in place, it's just a matter of economics before coal liquefaction can enter full-scale commercialisation.

Until recently, the cost of extracting and then liquefying coal has been much higher than the cost of refining crude oil, but the economics will change with the unavailability or increasingly exorbitant cost of crude oil and its by-products.

This article first appeared in the September edition of MER and has been published in Forum with kind permission of its author and publisher

Patrik Wheeler

CORPORATE HEADQUARTERS

Høvik (Oslo)
 NO-1322 Høvik
 Norway
 Tel: +47 67 57 99 00

ABERDEEN

Cromarty House
 67-72 Regent Quay
 Aberdeen AB115AR
 United Kingdom
 Tel: +44 (0) 1224 335000

COPENHAGEN

Tuborg Parkvej 8,
 3rd Floor
 DK-2900 Hellerup
 Denmark
 Tel: +45 39 45 48 00

DUBAI

PO Box 11539, Jumeirah
 Dubai
 United Arab Emirates
 Tel: +971 4 3526626

ESSEN

Businesspark Essen - Nord
 Schnieringshof 14
 45329 Essen
 Germany
 Tel: +49 201 7296 0

GOTHENBURG

Neongatan 4B
 43153 Mölndal
 Gothenburg
 Sweden
 Tel: +46 31 727 6400

HELSINKI

Nahkahousuntie 3
 (Sinnbyxvägen 3)
 00210 Helsinki
 Finland
 Tel: +358 9 681 691

HOUSTON

16340 Park Ten Place
 Suite 100
 Houston, TX 77084
 United States
 Tel: +1 281 721 6600

KOBE

Kobe Port PO Box 77
 Kobe 6510191
 Japan
 Tel: +81 78 291 1302

KUALA LUMPUR

24th Floor, Menara Weld
 Jalan Raja Chulan
 50200 Kuala Lumpur
 Malaysia
 Tel: +603 2050 2888

LONDON

Palace House,
 3 Cathedral Street
 London SE1 9DE
 United Kingdom
 Tel: +44 (0) 20 7357 6080

MADRID

C/Almansa
 105- 1ª Pta.- Ofic. 2
 28040 Madrid
 Spain
 Tel: +34 91 4561600

MILAN

Centro Direzionale Colleoni
 Palazzo Sirio 2,
 Viale Colleoni 9
 20041 Agrate Brianza (MI)
 Tel: +39 039 6899 905

MUMBAI

Emgeen Chambers, 10, C.S.T. Road,
 Vidyanagari, Kalina
 Santacruz East
 Mumbai 400098
 India
 Tel: +91 22 26650909 / 26654606

NEW JERSEY

Crossroads Corporate Center
 Suite 1200
 One International Boulevard
 Mahwah, New Jersey 07495
 USA
 Tel: +1 201 512-8900

OSLO

N-1322 Høvik
 Norway
 Tel: +47 67 57 99 00

PIRAEUS

26-28 Akti Kondyli
 Piraeus 18545
 Greece
 Tel: +30 210 41 00 200

RIO DE JANEIRO

Rua Sete de Setembro,
 111/12th Floor
 20050 006 Rio de Janeiro,
 Brazil
 Tel: +55 21 2517 7250

ROTTERDAM

Box 9599
 3007 AN Rotterdam
 Netherlands
 Tel: +31 (0) 10 2922600

SEOUL

Room 2110, Kyobo Bldg.,
 Jongro 1, 1-KA, Jongro-Ku
 Seoul 110714
 Republic of Korea
 Tel: +82 2 734 7326/7

SHANGHAI

House No. 9,
 1591 Hong Qiao Road
 Shanghai 200336
 China
 Tel: +86 21 6278 8076

SINGAPORE

DNV Technology Centre
 10 Science Park Drive
 Singapore 118224
 Singapore
 Tel: +65 6779 1266

STOCKHOLM

Box 30234
 10425 Stockholm
 Sweden
 Tel: +46 8 587 940 00

SYDNEY

Level 19, Northpoint
 100 Miller Street
 North Sydney, NSW 2060
 Australia
 Tel: +61 2 9922 1966

DNV PETROLEUM SERVICES PTE LTD

27 Changi South Street 1
 Singapore 486071
 Tel: +65 6779 2475

DNV INTERNET HOME PAGE

www.dnv.com

MANAGING RISK

