



## World-class information model

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– a leading waste water  
treatment supplier

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## Complex deliveries to offshore Angola

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Jotne assembles gas turbine packages

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# About the Jotne Group

www.jotne.com

## INDUSTRY

### Jotne Prosjekt AS

Project management  
Founded 1996. Location: Oslo  
Product areas: project management, project administration, multidiscipline contracts, EPC contracts, product and technology development, Sandwich Plate System deliveries.  
Mng. Director: Ole Martin Moe  
Tel. +47 23 17 15 50, fax +47 23 17 15 51  
E-mail: ole.martin.moe@jotne.com

### Jotne EPM Consultants AS

Engineering and consulting services  
Founded 1982. 33 employees. Location: Oslo  
Product areas: value-adding engineering services in the industrial and offshore sectors, mechanical design/analysis, rolling stock.  
Mng. Director: Nils Olav Solum  
Tel. +47 23 17 16 00, fax +47 23 17 16 01  
E-mail: nils.olav.solum@jotne.com

### Jotne Hollung AS

Supplier of waste water treatment equipment  
Founded 1963. 30 employees. Location: Fredrikstad  
Product areas: design and supply of equipment for waste water treatment plants, including sieves, scrapers, sand dewatering installations, transport screws, gates and centrifuges; construction, modernisation and upgrading of water and waste water treatment facilities; production of thin plate products and transformer substations.  
Mng. Director: Jan Vidar Markussen  
Tel. +47 69 35 20 20, fax +47 69 35 20 21  
E-mail: jan.vidar.markussen@jotne.com

### Jotne Mekaniske Verksteder AS

Equipment supplier and fabrication  
Founded 1918. 90 employees.  
Locations: Fredrikstad and Halden  
Product areas: heat exchangers and heat recovery plants, process packages/modules for the oil and gas industry, constructions made from carbon steel/stainless steel/aluminium, testing of subsea equipment, pipes and pipelines, tanks/silos/high-pressure containers, development projects, installation and service.  
Mng. Director: Roger Cielicki  
Tel. +47 69 38 52 00, fax +47 69 38 52 01  
E-mail: roger.cielicki@jotne.com

### Jotne Ankers AS

Building supplies  
Founded 1984. 15 employees. Location: Halden  
Product areas: stairs, banisters/handrills, balconies, gratings and treads.  
Mng. Director: Benny Richard  
Tel. +47 69 21 73 50, fax +47 69 21 73 51  
E-mail: benny.richard@jotne.com

## INFORMATION TECHNOLOGY

### Jotne EPM Technology AS

Founded 1994. 30 employees  
Locations: Oslo, Paris, Toulouse and St. Petersburg  
Product areas: development and sale of the EXPRESS Data Manager™ software suite, a database and communications solution for product data, data conversion, information quality and long-term archiving solution.  
Mng. Director: Jorulv Rangnes  
Tel. +47 23 17 17 00, fax +47 23 17 17 01  
E-mail: epmtech@jotne.com

### Jotne Enterprise Product Modeling AS

IT consulting services  
Location: Oslo  
Product areas: development of solutions based on EXPRESS Data Manager™.  
Mng. Director: Jorulv Rangnes  
Tel. +47 23 17 17 00, fax +47 23 17 17 01  
E-mail: enterprise@jotne.com

## PROPERTY

### Jotne Eiendom AS

B-Plan Prosjekt AS  
Grenseveien 107 AS, Oslo  
Industriveien 5-11 AS, Fredrikstad  
Jotne Kråkerøy AS, Fredrikstad  
Flatebyvn. 1 AS, Halden  
Haldenveien 6 AS, Fredrikstad  
E-mail: vibeke.sorensen@jotne.com  
Tel. +47 23 17 15 17, fax +47 23 17 15 51

## UPDATE FROM THE CEO

# Jotne

– technology first and foremost



**THE JOTNE GROUP** may seem as if it is made up of a disparate collection of businesses, but if you take a closer look at Jotne's history and background, you will find a common thread linking them all.

**FROM** a small beginning as EPM Consultants 25 years ago, Jotne has developed step by step in a number of directions. Yet the fundamental industrial platform of technology and engineering is common to all our businesses. Today, Jotne comprises a group of highly skilled **engineering** companies, which supply knowledge, products and services to the oil and gas, processing and manufacturing, transport and environmental sectors.

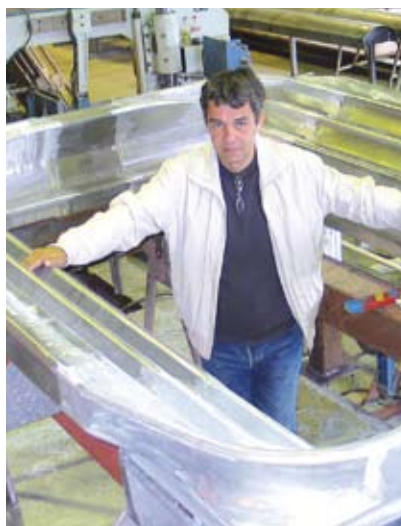
**FIFTEEN YEARS** ago this understanding of technology, engineering and production formed the starting point for our expansion into the area of **technical support/Information Technology systems**. Jotne's software is used today by the world's leading civil aviation, space technology, oil and gas, vehicle manufacturing and defence industries. Our solutions are based on our own groundbreaking technology which takes as its starting point our customers' desire for standardised data models and data exchange formats.

**OUR THIRD** business area, **property management, ownership and development**, supports our industrial activities. In our view it is both necessary and desirable to have full control over our production facilities. Today we own all the properties in which we have operations, and see that this provides long-term security for our businesses. Our activities in the property market will eventually afford opportunities for spin-offs in the form of redevelopment projects, with our sound technical and industrial competence providing a good foundation for future investments.

**OUR WAY** of thinking may be a little unusual at a time when the trend is to 'concentrate' technologies and markets. However, we believe that highly competent, all-round technological environments help to spawn and develop good ideas. Over the years we have proved this by developing centres of excellence within several of our core businesses. Our versatility also offers us protection against changes in the business cycle. Although we must always be prepared for difficult times, we feel that the Jotne Group's ability to adapt rapidly to change puts us in a strong position to meet whatever challenges may arise in the form of growth or consolidation. ●

  
J. Aa. Sørensen, CEO Jotne Group

See page 8:  
**Jotne is the main supplier of Trelleborg, Roger Cielickis first client.**



At the front page: Sten Rudolf Frebrich (to the left) and Helge B. Holgersen.

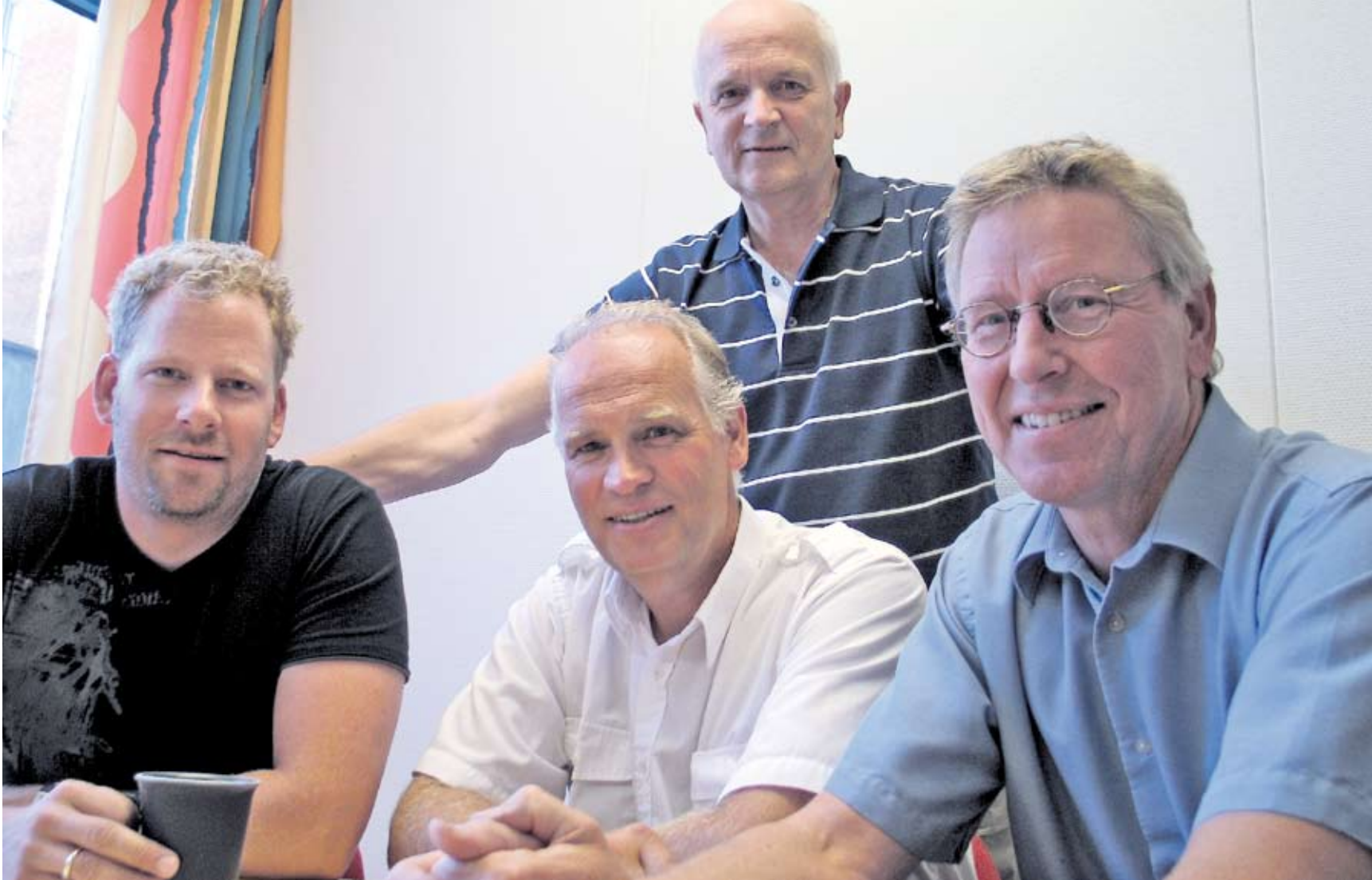
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## JOTNE LINK

PUBLISHER/EDITOR: KJELL HØGLO, JOTNE PROSJEKT  
TEL. +47 23 17 15 62  
E-MAIL: KJELL.HOGLO@JOTNE.COM

PROJECT MANAGEMENT:  
TURID VIKER BRÅTHEN, LYNX PORTER NOVELLI



"Our engineers can draw on each others' wide-ranging experience, which makes our team extremely flexible," says Mng. Director Nils Olav Solum (behind). Department Managers Bjørn Lindberg Bjerke (left), Bjørn Johansen and Håvard Grønbeck agree.

## Rolling stock with an Italian twist

*Saverio Struksnæs Ventrelli from Bari in southern Italy is the latest addition to the team of rolling stock experts at Jotne EPM Consultants (EPMC). Ventrelli's electromechanical background is perfect for the EPMC trams and trains department. The department has a staff of 11 and is headed by Håvard Grønbeck.*

**EPMC GOT** involved in the tram and train sector in 1993, when the Norwegian state-owned railway company, NSB, upgraded its Sundland maintenance depot in Drammen. This project provided good contacts with the railway engineering fraternity. From 1995 to 1998 Håvard Grønbeck was himself employed at AdTranz, which built the new airport

express trains and NSB's Signature trains. EPMC was engaged on an increasing number of projects for AdTranz (later acquired by Bombardier) during this period, and demonstrated to the market that this was an area on which the company was keen to focus. Assignments for Oslo Sporveier, the Norwegian capital's tram and subway system operator, followed – particularly in connection with the purchase and introduction of new tram stock from Italy.

"**OUR SPECIALTY** is the rolling stock, plus modification work, upgrading and maintenance," says Håvard Grønbeck.

"**OUR** engineers can draw on each others' wide-ranging experience, which makes our team extremely flexible. For example, we use people with an offshore background to initiate and complete projects. When AdTranz closed its production and engineering department, some of their key personnel came over to us. And this competence is still attractive in the market."

**NSB HAS** a great deal of engineering expertise, but needs more capacity to refurbish and upgrade the rolling stock, engag-



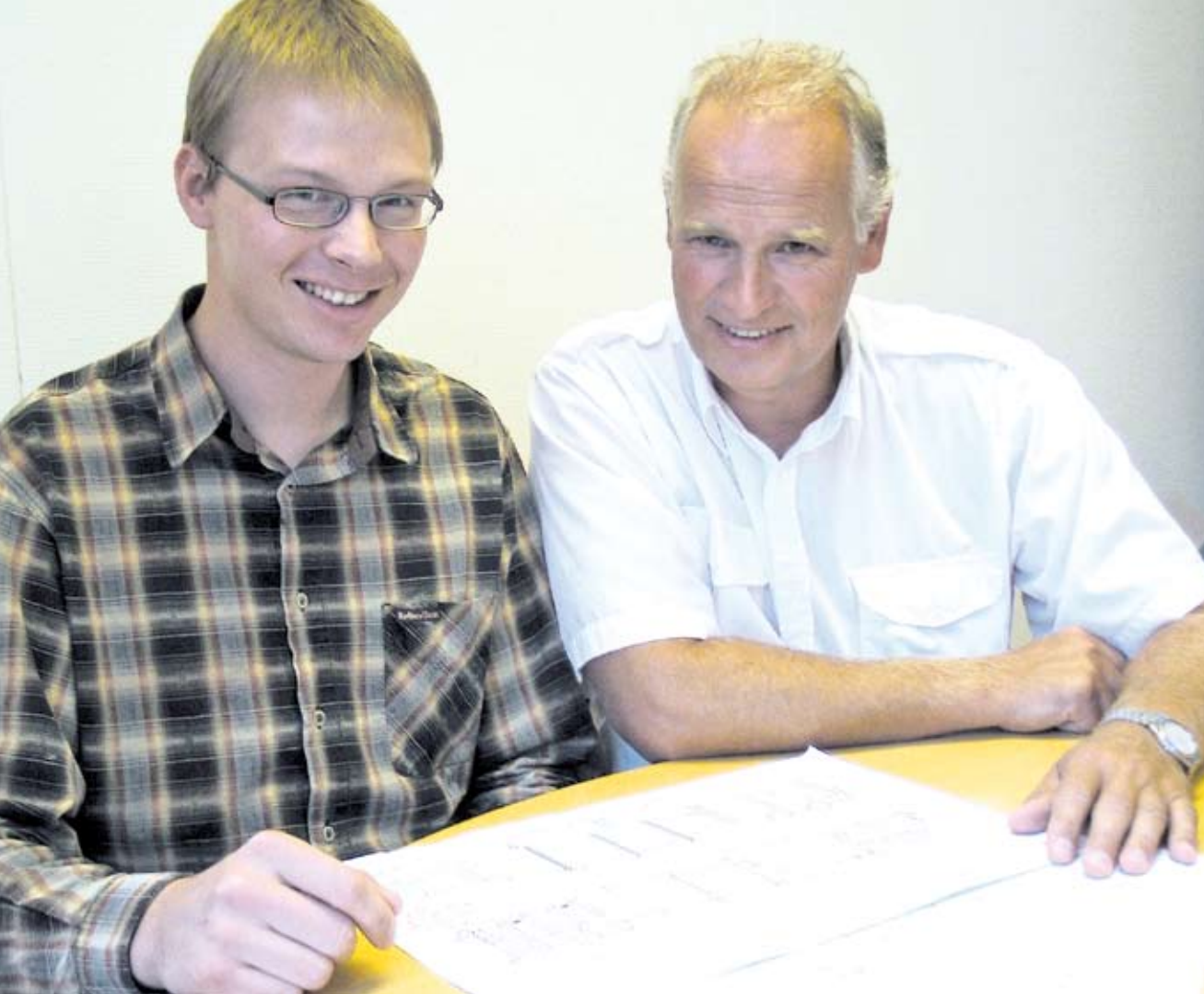
Saverio Struksnæs Ventrelli from Italy adds an international perspective to the rolling stock department.

ing external resources particularly for interior refitting.

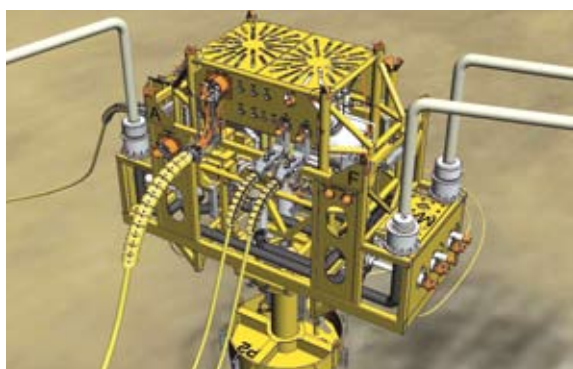
"**EPMC ALWAYS** uses the most up-to-date software tools for calculations, 3D modelling and design," says Håvard Grønbeck. ●

### ROLLING STOCK PRODUCTS AND SERVICES:

- Project management
- Design
- Interiors
- Exteriors
- CAD / 3D modelling
- Calculations
- Production follow-up
- Documentation
- Customer support in the procurement phase
- Development and construction of mock-ups and prototypes



**Pål Martin Greni** performed his job to everyone's satisfaction. His proud colleagues, here represented by Bjørn Johansen, are extremely pleased with the 'rookie'.



## In at the deep end

*Pål Martin Greni joined Jotne EPM Consultants (EPMC) in November 2005, and was immediately thrown in at the deep end – literally as well as metaphorically. And let there be no doubt, he performed his job to everyone's great satisfaction, including – most importantly – the customer, Aker Kværner Subsea.*

**EPMC WAS** contracted to optimise the heat exchange function of a pump which was to be installed on BP King at a depth of 1,500 metres below sea level. Aker Kværner Subsea had been tipped off by another supplier that EPMC could do the task – which was true.

**WITH A** mechanical engineering diploma from Oppland University College and two years of mechanical and process engineering studies at the Norwegian University of Life Sciences (UMB), Pål Martin Greni was tailor-made for the job. Not least because his upbringing on a farm in Vormsund, Romerike, had also given him a practical approach to solving technical problems.

**"A 3D** model was very useful in this case. We had to start from scratch, and the whole system was based on a design we developed here," says Bjørn Johansen, Department Manager of Jotne EPM Consultants (EPMC). The heat exchanger was built by Jotne Mekaniske Verksteder, the pump delivered from Germany, while testing is underway at Aker Kværner Subsea in Tranby.

**"ASA** rookie it was encouraging to be given such an exciting assignment. Nevertheless, I am aware that I have a lot to learn before "I get my wings" as a consultant," Greni says modestly.

**"WORKING METHODOLOGY,** customer relations, resource allocation and time are all things I need to focus on. It all comes down to dollars and cents, and it is good to know that EPMC has excellent routines for project management and project working."

**GRENI WAS** also pleased to feel that people had faith in him and gave him confidence. "Many companies are reluctant to take on young and inexperienced people. It was good to know and see that what I had learned could be applied and turned into a tangible piece of equipment that would be useful to the oil industry."

**IN ADDITION** to Bjørn Johansen and his colleagues at Jotne, Greni names Aker Kværner Subsea's Sonja Hauge as someone who has given him a lot of support. Greni is looking forward to his future career in an environment numbering more than 30 highly skilled and experienced engineers, who are called on to undertake a wide range of different assignments. ●



Bjørn Håvard Solli, relies on Jotne Mekaniske Verksteder for help with preventive maintenance, or when a quick repair is needed.

## Tusenfryd puts accident prevention first

*“We close an attraction immediately if we have the slightest indication that something is not as it should be,” says Bjørn Håvard Solli, Operations Manager at the Tusenfryd amusement park.*

“**AND THIS** is where our job begin,” says Runar Syvertsen from Jotne Mekaniske Verksteder. “Normally we have until 11 o’clock the next morning, when the park opens, to find out what is wrong, decide what needs to be done and make the necessary parts. It is hectic and challenging, but the result is happy children and adults having fun in safety.

“**DURING THE** closed winter season, we overhaul the rollercoasters, and every second year we check the ThunderCoaster for wear and tear as well as doing a material inspection,” he adds.

**TUSENFRYD HAS** done extremely well since it opened in June 1988.

Major investments have increased the number of attractions year by year, and this year’s NOK 75 million investment in the Speed-Monster ride is the biggest ever.

“**WE HAVE** four ‘truths’, which we impress upon all our 750 seasonal workers. These are friendliness, beauty, speed and safety. And for us, safety is the most important,” says Solli.

“**THE SEASON** is short, and if anything happens we are dependent on a fast response. That is why it is good to be able to turn to Jotne, providing us with both resources and expertise, within construction technology and mechanical engineering.”

## SPS – an innovation for shipbuilding and construction

*The Jotne Group has taken over responsibility in the Nordic region for the Sandwich Plate System (SPS) developed by the London-based company Intelligent Engineering. SPS is a composite material comprising two metal plates separated by an elastomer core. For the shipbuilding industry this means a lighter building material than traditional steel plates. At the same time the ship’s structure is simplified, which cuts maintenance costs. It also reduces material fatigue problems, considerably extending a ship’s lifespan.*

**THE TECHNOLOGY** is constantly being improved. While the system’s main area of application is in shipbuilding, the construction industry is also a target market. “Both industries are conservative, and the introduction of new technology takes time,” explains Ole Martin Moe, Mng. Director of Jotne Prosjekt.

**FOR THE** material to be used in the construction of new ships, the shipyards need to change the way they organise their work. Today’s production lines are organised to meet the needs of old technology, and it is the shipowners who must take the initiative. One of the benefits of using SPS is that it cuts construction time by 20-30 per cent. Shipyards and shipowners can also save a lot of time by using SPS technology in connection with repairs and the replacement of steel plating.

**FOR EXAMPLE,** a plate that needs to be replaced can be sandblasted

completely clean, a new steel plate placed over the top and an elastomer from Intelligent Engineering injected into the gap between. A number of Norwegian shipowners have already used the SPS method, including Klaveness, Bergesen and Trico Supply, which replaced the entire deck of a supply ship using SPS technology.

**THE TECHNOLOGY** has been adopted mainly in high-cost countries, but an office is soon to be opened in China for marketing to Asian shipyards. Jotne Prosjekt’s task is to show Nordic shipowners the opportunities and advantages of this technology.

**WHILE JOTNE** Mekaniske Verksteder can undertake the steelwork required in connection with ship repairs, IE’s own staff are currently brought in to perform the actual injection operation. ●



SPS technology considerably extends a ship’s lifespan.



A specially designed box sieve is just one of the products developed by Jotne Hollung

## Jotne Hollung – a leading waste water treatment supplier

*In August 2006 Hollung Holding was acquired by the Jotne Group. The company's former owners had long been searching for an industrial partner to help develop the business, and both sides quickly agreed that a takeover was the right solution.*

**JOTNE HOLLUNG** was founded by Peder Hollung in 1963. In the 1980s it was sold to new owners, who have now passed the business on to the Jotne Group. Jotne Hollung's main market is in the water and wastewater treatment sector. For many years the company has been a key player in this area, both as a systems designer and product supplier.

**JOTNE HOLLUNG** has developed a number of products, sieves, scrapers, sand dewatering installations, transport screws, and gates for channels adapted to the water and waste water market. This type of equipment is also exported to a number of countries through a dedicated network of distributors. The summer of 2006 Jotne Hollung

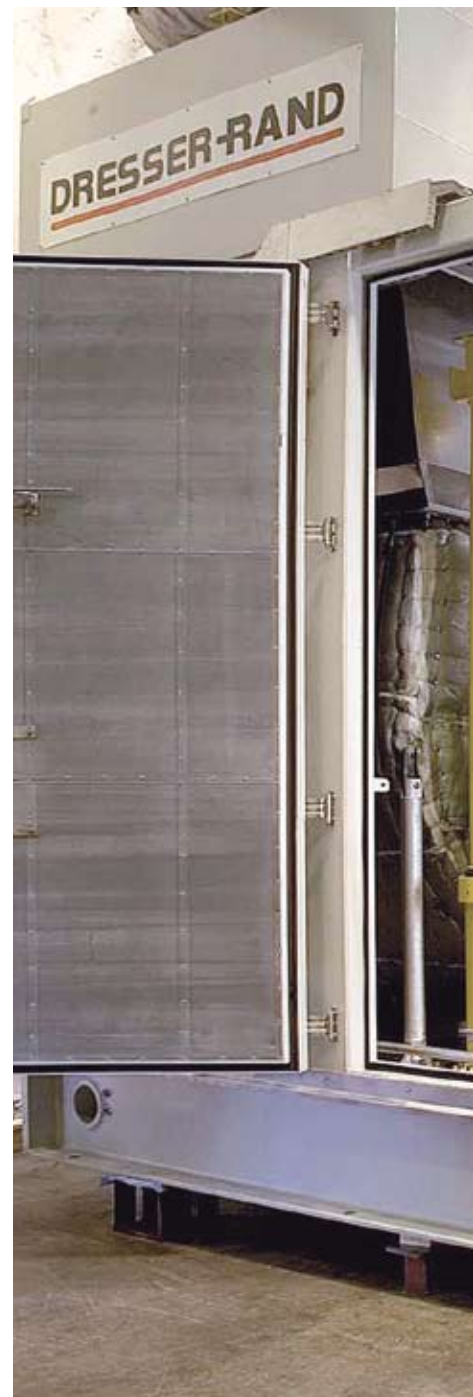
won a contract to supply the equipment for three waste water treatment plants in Ireland. Jotne Hollung also supplies third-party equipment to the water and waste water sector from selected high quality manufacturers, including Noxon centrifuges and Nordic Water's patented lamella scraper.

**JOTNE HOLLUNG** has supplied a large number of waste water treatment facilities in Norway. The company has supplied equipment and services to more than 300 such plants since 1974. Projects of this kind will continue to be delivered, but a lot of today's effort is aimed at the modernisation and upgrading of existing facilities. Jotne Hollung also produces a large volume of thin plate products (1-5 mm). Transformer substations for Schneider Electric Norge AS are an important part of the company's portfolio of thin plate products. Jotne Industrier sees Jotne Hol-

lung as a crucial part of the Group's continued focus within the area of environmental technology.

**JOTNE HOLLUNG'S** position in the water and waste water treatment market will provide a solid platform for further expansion within this sector. Combining Jotne Hollung's expertise with the Jotne Group's overall resources will produce a powerful unit with the capability to develop new technologies and products within Jotne Hollung's established markets, as well as benefit from synergies with other Jotne companies.

**JOTNE HOLLUNG** is located in Fredrikstad, while Jotne Mekaniske Verksteder has production facilities in both Fredrikstad and Halden. Jotne Hollung currently has a staff of around 30, all with extensive experience from the company, who handle in-house equipment manufacture and installation for water and waste water treatment facilities in Norway. ●



**"At the heart of the system is a large jet engine, a gas turbine which drives a large compressor or generator," says Stein Solberg of Dresser-Rand in Kongsberg.**



## Testing of a gas turbine at Jotne's production facilities in Halden.

system is a large jet engine, a gas turbine which drives a large compressor or generator," says Stein Solberg of Dresser-Rand in Kongsberg.

**"FOR A** long time most of our business was in the North Sea offshore market. West Africa and the Gulf of Mexico have been added, as well as onshore compressor stations for pipelines in a number of places around the world. The gas-turbine packages which Jotne has supplied for Turkmenistan, to the east of the Caspian Sea, are an example of the geographical expansion of our customer base."

**"WE HAVE** a very good partnership with Dresser-Rand," says Terje Rogstad of Jotne Mekaniske Verksteder in Halden. This was our first job for Dresser-Rand, and we both learned a lot from each other."

**JOTNE WAS** responsible for the entire mechanical assembly of the three units, in addition to the purchasing, prefabrication and installation of the pipework and tubing, as well as installation of electrical cables and carrying out all the electrical work. These were all areas in which Jotne could draw upon its 20 years' experience as a supplier of process packages to the North Sea offshore industry.

**WORK ON** the packages for Turkmenistan started in the autumn of 2005 and continued right up until the packages were brought to the port of Halden this summer. Dresser-Rand has an extensive sales network aimed at the offshore and onshore oil and gas industries in Houston, London, Le Havre, Kuala Lumpur, Abu Dhabi and Russia, in addition to Norway. The company's main products are large centrifugal compressors, piston compressors, steam turbines, turbo-expanders and power turbines.

**"WE ARE** the only unit in the Dresser-Rand Group to make gas turbine drivers like the ones we put together for Turkmenistan," says Stein Solberg. "The market is currently extremely dynamic, which is promising for the continued partnership between Dresser-Rand and Jotne."

**KJELL HØGLO**, Project Director at Jotne Prosjekt, is very pleased with the feedback he has received from Dresser-Rand's staff, who has had nothing but praise for Jotne's problem-free performance. ●

# Jotne assembles gas turbine packages

The Norwegian subsidiary of Dresser-Rand approached Jotne when they were commissioned to assemble three gas turbines for delivery to Turkmenistan.

*With Jotne Prosjekt as the contracting party and Jotne Mekaniske Verksteder as the operative unit, work began in the autumn of 2005 to assemble the three gas turbine drivers, each weighing more than 30 tonnes. The long journey to Turkmenistan started with the equipment being transported from the company's production facilities in Tistedal to the port of Halden earlier the summer of 2006.*

**WHEN KONGSBERG** Våpenfabrikk went out of business in 1987, Dresser-Rand acquired the company's gas turbine division. Dresser-Rand's Norwegian operations are still located with its head office at the Kongsberg Industrial Park. The parent company, Dresser Industries, was founded in Texas in the late 19th century. Today Dresser-Rand is listed on the New York Stock Exchange.

**DRESSER-RAND HAS** around 100 employees in Norway linked to multi-discipline engineering, project management and, most recently, a growing after-market for upgrading and renewal. Since 2004 Dresser-Rand has considerably downsized its workforce at its production facilities in Drammen, previously Drammen Slipp, and that was where Jotne came into the picture.

**DRESSER-RAND HAS** two main product categories: its own gas turbine, the KG2, and the assembly of large-scale gas-turbine packages, which is its main activity. "At the heart of the



Jotne Mekaniske Verksteder supplies the moulds – Trelleborg moulds the rubber. For Trelleborg's Terje Fossesholm and Merete Rønningen it is a perfect partnership.

## Trelleborg's main supplier

Jotne Mekaniske Verksteder in Fredrikstad has been the main supplier of Trelleborg Viking in Krokstadelva for more than a decade.

**"WE MUST** have spent thousands of hours in the workshop for Trelleborg, which has had explosive growth in both the Norwegian and international offshore markets," says Roger Cielicki, who heads Jotne Mekaniske Verksteder in Fredrikstad and Halden. Jotne supplies Trelleborg with different types of moulds for their product range. The Fredrikstad company has been involved right from the very beginning – including development and testing phases.

### FOCUS ON FIRE SAFETY

**"WE HAVE** had a particularly strong focus on fire safety, and we have faced an incredible number of challenges and made a great many design changes before we arrived at a final product. Our challenge has been to really get to know what kind of product the customer wants, and for Trelleborg the key issue has been offshore safety," Cielicki explains.

### JOTNE – A MAJOR SUPPLIER

**JOTNE MEKANISKE** Verksteder is one of our biggest non-rubber suppliers," says Merete Rønningen, Project Manager of Trelle-

borg. Jotne supplies many of the moulds for our products, and the company has become an important resource for us in the whole area of precision seals. There are many benefits to using rubber, and it is important for us to adapt the rubber to our customers' requirements with respect to weatherproofing and resistance to other forces. We are in a unique position as a producer of fire resistant materials and fire barriers combined with moveability, for which there is a huge demand in the offshore industry."

### FOCUS ON RUSSIA

**TRELLEBORG KROKSTADELVA** supplies such companies as FMC, Aker Kværner, Vetco and many others. You will find their products not only in the North Sea, but also in Korea, Malaysia, Canada and the UK. Trelleborg has also won substantial contracts for Sakhalin in northeast Russia.

**"WE ARE** working actively to gain a foothold in the Russian market, and last year had a major order for 155 huge bellows moulds for Sakhalin. We are involved in a project

to enter the market through Aker Kværner, and we have made good contacts in Russia through the Rob Roy field," says Terje Fossesholm, project manager of Trelleborg. "And, in conjunction with Jotne, we have supplied pipes and valves insulated with rubber from us for laying at a depth of 1,800 m off the coast of Angola. Here the end-user was BP"

### CHALLENGING WORK FOR THREE GENERATIONS

**ROGER IS** the second generation of Cielickis to work at Jotne. His father, Roman, worked for the company for 40 years, Roger's career spans 31 years, and now the third generation, son Morten, is in his sixth year. Fredrikstad Montering was founded in 1918, and was taken over by Jotne in 1992. In 2004 the company changed its name to Jotne Mekaniske Verksteder AS.

**"TODAY ALL** Jotne Mekaniske Verksteder's business is order based, but the customer's requirements vary enormously in each case. Some come to us with a detailed specification; thus

price and delivery times are the key factors for winning a contract. Other customers come with an overall idea, a rather vague specification and a tight deadline. They are looking for a partner/supplier with a skilled and creative workforce, and the ability to come up with a flexible solution. On our part, we would like more of this 'made-to-measure' work in the future, because it gives us exciting challenges and makes working here a unique experience," says Cielicki. ◆



"When I started working here as production manager ten years ago, Trelleborg was my first customer," says Roger Cielicki, head of Jotne Mekaniske Verksteder in Fredrikstad and Halden.



Travelling by train, sitting comfortably, Steinar Flo is the man to thank.



of a product. Nevertheless, getting the best solution requires painstaking preparation. I often say that function dictates form. That is why it is extremely important for the industrial designer to be brought in right at the start of the product development process. I think the car industry is very good in that respect, while mobile phones represent perhaps the opposite extreme – with looks often being more important than functionality.

**ONE SIZE FITS ALL**

**STEINAR FLO** has been designing train seats for many years.

**“THE OBJECTIVE** is to come up with a ‘one size fits all’ design. Train seats should suit the short and the tall, the fat and the thin, women and men. And when the seat feels comfortable for 95 per cent of users, you have achieved your goal. The answer to creating the most comfortable solution lies in how the back and seat move in relation to each other.”

**STEINAR FLO** has been involved in the design of many train seats, including the Inter City and express trains. Travelling by train, sitting comfortably, Steinar Flo is the man to thank. If your waffle is a good size and made to perfection, Flo might also be the man responsible. He has designed an electric waffle iron for Sønnico. In that case investigating how the waffle batter expanded to fill the mould was just as important as making sure the machine looked good on the kitchen counter.

**MODULAR RAILING SYSTEM**

**STEINAR FLO** is currently working on a project for Jotne Ankers; how to rationalise the manufacture of banister/railing systems. Jotne Ankers wants to see if it can develop a modular product with a few basic elements that can be assembled in many different ways. For the architect, the freedom to select a novel solution is important. Jotne Ankers aims to achieve a flexible system which satisfies both those who want a ‘made-to-measure’ solution and those who are content to choose one off the shelf.

**JOTNE ANKERS** is used to customisation, price squeeze and deadlines. The company is using industrial design to develop innovative new solutions for the benefit of producer, architect and end-user.

# Industrial design – more than good looks

*Although industrial designer Steinar Flo is a relatively recent addition to the Jotne team, he has worked as a freelance industrial designer since 1977. “I have always wanted to stay a generalist. I have worked on everything from small, window-related products to lifeboats and evacuation systems for oil rigs and ships,” he says.*

**A MATTER OF LIFE OR DEATH**

**“BY THEIR** nature, lifeboats are intended for use in situations characterised by panic, stress and often difficult sea conditions. Because of this, there are few industrial design challenges as critical as finding the most efficient way to get people quickly and safely onto a lifeboat. When you consider that 80 people have to be accommodated on a 48-foot vessel, which will then be dropped 28 metres straight down into a heaving sea, effective industrial design becomes truly a matter of life and death.”

**PAINSTAKING PREPARATION FOR AN OPTIMAL SOLUTION**

**STEINAR FLO** has designed products with an annual production volume of half a million. For these products the issues are completely different to designing a free-fall lifeboat or, as now, the development of new stair and banister/railing solutions for Jotne Ankers.

**“STAIRS ARE** often custom-made, and it requires a different way of thinking when you are going to make only one or four examples



“Stairs and railings have become one of a building’s decorative features, with lots of variation and combinations,” says Bente Bratli, Jotne Ankers.



“Jotne Ankers is solution-oriented, has a good overview and a high level of delivery performance,” says Ole Vestersjø.

what could become problematic. Their installation people are skilled and solution-oriented. The work is well planned, and being proactive any problems are flagged early in the process. Quite simply, we like working with them.”

**SOLD OUT**

**THE PILESTREDET** Utsyn AS is a 15,700 sqm development divided between 137 apartments, varying from one-room studio-apartments of 25 sqm to a penthouse apartment of 170 sqm. The entire project, which commenced in October 2004 and was completed early this July, is sold out.

**PEAB IS** already busy building student accommodation a stone’s throw further down the road, on the site of the former National Hospital. Jotne is supplying the banisters/railings for this development, too.

**ANYTHING IS** possible, it is just a matter of finding the right combination and the simplicity which makes the stairs and banisters an attractive feature of the building. There is also a growing trend in which open balconies are being glassed in to form an extended living space. 60-70 per cent of Jotne’s products are produced in-house. Some glass and wood components, as well as some manufacture, are however outsourced.

“**OUR STRENGTH** is that our production facilities are close at hand, we have a fast delivery time, we are very flexible and are competitive on price,” says Benny Richard.

**JOTNE ANKERS** can point to participation in a number of prestige projects. Project Manager Bente Bratli is keen to highlight Frogner upper secondary school, the redevelopment of Lysaker Brygge and Oslo’s Skøyen district, Selvaag’s redevelopments at Sogn and Løren, their Moss glassverk redevelopment, Brånåsen redevelopment in Skedsmo and Bjørnson building in Moss, the Grønland Bazaar for Thon, the spiral staircase in the renovated Postgiro Building, and now the Tjuvholmen and Bjørvika redevelopments. ●

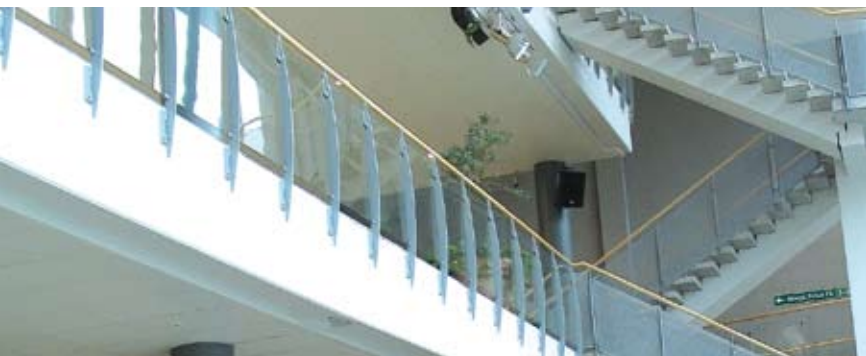
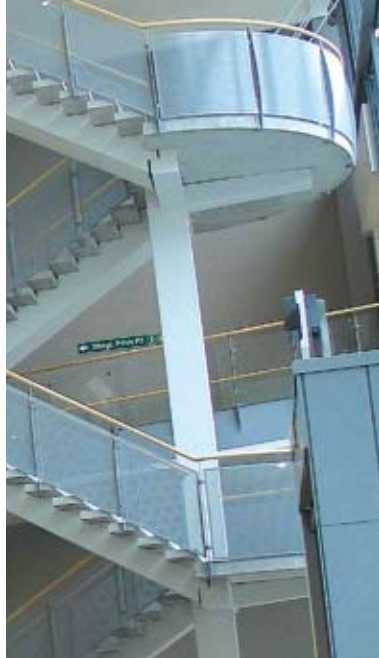
**SKANSKA, NCC, PEAB, Veidekke, Bunde Bygg, Heimdal, Glomsrød and AF Bygg Øst** (previously Brødrene Holstad) are all among Jotne Ankers’ many customers. A frame agreement with Selvaagbygg and a position as ‘main supplier’ obviously count as jewels in the company’s crown.

**OLE VESTERSJØ**, Project Manager for PEAB in connection with the redevelopment project Pilestredet Utsyn AS pays tribute to Jotne Ankers’ performance on the projects he has been responsible for.

“**WE BROUGHT** Jotne into the Marienlyst Park project, where they did an excellent job for us,” says Vestersjø. “That meant we were keen to have them on board here at Pilestredet and on other projects – naturally in competition with other suppliers. We chose Jotne Ankers because of the overall package of quality, reliability, organisation and price. Jotne Ankers have had a very high level of delivery performance. They have a good overview and fix

## Functionalistic renaissance

*According to Benny Richard, Mng. Director of Jotne Ankers in Halden, functionalism is on its way back as a style trend for stairs and banisters/railings. Richard has all the major building contractors on his customer list, as well as many of the medium-sized and smaller ones – including local builders with 5-10 employees.*



"Jotne's contribution has resulted in the jewel we were hoping to create," says Arve Kjøll Olsen, pictured here at the new Bjørnson redevelopment which is changing the face of Moss town centre.

## Grand gala in Moss

The Bjørnson building is the largest project ever undertaken by AF Bygg Øst.

*On 2 November everything is ready for the grand gala opening of the additional 25,000 sqm – including a 550-space car park – which, together with the existing Amfi Centre, has resulted in a shopping centre covering a massive 70,000 sqm.*



**AF BYGG** Øst has a workforce of some 130 people and annual gross revenues of NOK 350 million. Formerly Brødrene Holdstad, the company is now part of the AF Group, one of the country's leading building contractors. AF Bygg Øst has projects throughout Østfold county and southern Akershus, ranging from enormous shopping centres to housing complexes, industrial premises, schools and churches.

"**A RAILING** is like a jewel that is put in place very late in the building process. If it does not look good, it can spoil the overall impression," says Arve Kjøll Olsen, VP Projects of AF Bygg Øst.

**THE BJØRNSON** building is a substantial boost for the whole of Moss town centre, together with granite paving in the streets and new greenery.

"**IT HAS** been fun to work with Jotne Ankers, from start to final delivery," says Kjøll Olsen. "Jotne comes up with a lot of good solutions early in the process and makes a substantial contribution through the production of designs and communication with the architect. Jotne has also provided skilled craftsmen to handle the actual installation, and it is clear that these are experienced people who know their business. In a project like ours, you are dependent on your suppliers doing their job. In that area, Jotne has been exemplary. And Jotne's contribution has resulted in the jewel we were hoping to create." ◆



**A few of the Jotne Group's 20 new recruits. From the left:** Stian Solberg, Saverio Struksnæs Ventrelli, Ole Martin Moe, Morten Berg, Admir Dzanic, Nadia Rincon, Janne Aas-Jakobsen, Grunde Wahl, Olav Liestøl, Tom Mathisen, Nicolai Friis, Alf Pettersen

## New recruits on all fronts

It is safe to say that the Jotne group of companies is an attractive place for engineers, software developers and project workers. In 2006 a large number of very highly qualified staff have joined the Jotne Group. Most of them work in the Group's engineering, computer and project teams in Oslo, but Jotne EPM Technology's office in St Petersburg has also been joined by two well qualified software developers.

**THE FACT** that Jotne has managed to attract such a large number of skilled people is unique at a time when Norwegian industry is crying out for experienced engineers, particularly in the oil and gas sector, where activity levels are high.

**OF COURSE**, there may be many reasons why engineers choose Jotne, but it seems clear that giving them technically chal-

lenging assignments for a wide variety of customers and markets is something that is seen as meaningful and professionally exciting. This, together with the opportunity to work with good colleagues in a learning environment, provides a high level of employee satisfaction and a stable workforce.



Exciting and challenging assignments face Nadia Rincon Turpin (left), Tina Lysgård and Janne Aas-Jakobsen every single day.

## Three women strengthen staff

Jotne EPM Technology is a typically male-dominated company, but now it has strengthened its staff with the addition of three young women.

**JANNE AAS-JAKOBSEN** has an MSc in civil engineering and a Master in Technology Management from the Norwegian University of Science and Technology (NTNU). She joins Jotne from the SINTEF Byggforsk research foundation, where she has worked with the buildingSMART standardisation scheme. Ms Aas-Jakobsen has worked with Jotne EPM Technology for five years, so she is familiar with the challenges awaiting her.

**TINA LYSGÅRD**, Administration Manager, has a degree in marketing. Sales and follow-up of program licences form part of her working day. She also works closely with the marketing manager in connection with marketing-related tasks, including trade fairs and exhibitions.

**NADIA RINCON-TURPIN** is from Spain and has a degree in computer technology. At university in Spain she was offered the chance to study in another country and chose Norway. Ms Turpin has worked as a programmer in Spain and Germany, but now Jotne EPM Technology has the benefit of her extensive professional experience.

The new recruits' qualifications and assignments can be summed up as follows:

### IT SOLUTIONS FOR ENGINEERING DATABASES

- Senior development engineers with experience from the IT industry
- MSc level engineers specialising in software development
- Two PhD level engineers, one with a PhD in mathematics, employed at Jotne's office in Russia
- Project managers with experience from international IT projects
- Software developers

### MECHANICAL DESIGN AND CALCULATION

- MSc electromechanics and senior mechanical engineer with experience of rolling stock
- MSc in mechanical engineering design and product development
- MSc and senior engineers specialising in analysis and advanced calculation

### PROJECT MANAGEMENT AND ADMINISTRATION

- IT manager and data network developer
- Project administration and management
- Sales, tender management and project completion

# Shell chooses EPMT tools

Shell is using tools from Jotne EPM Technology to streamline its global business activities.

*EDMvisualExpress™ is being used to develop Shell's downstream model. When it is completed the data model will be used to specify Shell's information requirements in all downstream activities, ie the distribution, marketing and sale of energy and petrochemical products.*

**MATTHEW WEST**, head of Reference Data Architecture at Shell in London explains: "The data model project is part of a larger project to globalise Shell's businesses and processes. Traditionally we have customised our systems for particular environments or countries. However, we see that having global processes provide significant benefits, particularly in the field of information technology. That is why we are now developing our processes so that we can operate our businesses in the same way worldwide."

**AS ONE** of the developers of the ISO 15926 data model, West believes that if you are going to

do something jointly, you have to have a shared language. "In our case that language has its source in reference data, combined with the data model," he says.

**THE REFERENCE** data include all the static data for products, materials and production processes. This is stored in Shell's database. The data model provides a logical and structured method for identifying and organising the necessary data, as well as specifying Shell's information requirements with respect to its downstream operations.

**WEST EXPLAINS** that he and his colleagues at Shell wanted to

use Jotne EPM Technology, and in particular EDMvisualExpress™, because they had already had positive experience of both the company and the product.

**OTHER IMPORTANT** factors in the selection of EDMvisualExpress™ include the fact that it is relatively simple to use and has a good publishing solution. It also allows several models to work with different, but integrated, forms.

**MATTHEW WEST** and his team of developers have been working on a downstream data model since June 2005. "One of our strategies has been to divide the downstream model into forms,"

he says. "This makes it possible to give the different forms to different data modellers. We have eight modellers in the team and each one has one or more forms working in parallel. With the capacity afforded by EDMvisualExpress™ we are now able to create references between the forms, which means we can work more efficiently." ●



Jotne's apprentices become experts at tackling traditional industrial and offshore assignments. From the right: Petter Agerup (industrial plumber, Halden), Leif Johannessen (sheet metal worker, Halden), Kim Golden (sheet metal worker, Halden), Atle Nelle (sheet metal worker, Halden), Ahmed Sheekh, (sheet metal worker, Fredrikstad), Camilla Widell (sheet metal worker, Fredrikstad), Fabian Schmidt (welder, Fredrikstad) and Ole Christian Andersen (sheet metal worker, Fredrikstad). Pål Espen Brynildsen (sheet metal worker, Fredrikstad) was not present when this photo was taken.

## Apprentices aplenty

**Apprenticeships are very important for Jotne Industrier. The company currently has four apprentices in Halden and five in Fredrikstad.**

**GIRLS, TOO**, are discovering that this is a job that offers exciting challenges. Camilla Widell is Jotne's first female apprentice, and both sides are very happy with the arrangement.

**"WE HAVE** stuck to the apprentice scheme," says Roger Cielicki, Mng. Director of Jotne Mekaniske Verksteder. "In our experience, employees who have trained with us are the ones

who become the best in their fields. This investment will pay dividends for us in the years to come." ●

# World-class information model

*Before construction work has even started on the Tromsø University College's new 5,150 sqm campus building, Statsbygg (Directorate of Public Construction and Property) used the EDMmodelServer™ from Jotne EPM Technology. The result is a unique building information model (BIM), which is truly world class.*

**"THIS REPRESENTS** a paradigm shift for the building and construction industry," says Janne Aas-Jakobsen, Director Built Environment, Jotne EPM Technology.

**"WHAT MAKES** EDMmodelServer™ different is that it produces a digital model that is shared by all disciplines based on a non proprietary format. In other words, all the various parts of a project enter their components into the server to create an overall data model of the building. Previously, each of the various disciplines created their own separate drawings or models, now they are working on the same building information model (BIM)," she explains. The new approach is called buildingSMART.

**THE BUILDING** industry is, like many other sectors, fragmented and covers many fields and professions.

**"A NATURAL** consequence of this, is highly specialised software, with each application covering only a limited part of the building information."

**THERE ARE** separate programs for construction, building descriptions, CAD drawings, calculations, estimates and contracts. In addition, each profession usually has its own standards and terminology. Having lots of different standards is not in itself a problem. The problem is that the standards for information exchange do not 'meet in the middle'. The most common method of moving information from one phase to another is still manual data entry. It goes without saying that this

is not only a time-consuming process, it also means that a lot of information is lost along the way. However, an international standard will change all this.

#### OPEN FORMAT

**EDMMODELSERVER™ USES** an open format built on Industry Foundation Classes (IFC). IFC is a new format for information storage and exchange between all the parties in all the phases of the building process. It enables several participants in the same value chain to link up to and work on the same platform.

**IN THE** IFC standard, design information, product characteristics and processes are linked together with the objects they represent. A drawing is simply one way of looking at a building project. Calculations, building descriptions, space allocations and energy calculations are other possible ways of looking at the same building model. In the IFC world, all the information about the project is contained in the same model. This can require slightly more work early on in the project, when the building information model is being established, but produces significant savings as the process progresses, since the information can be reused and modified.

#### ONE SHARED STRUCTURE

**"IN AUGUST** 2005 Statsbygg signed an R&D agreement with a Bodø-based design team for Tromsø University College. That autumn the team designed a data model using IFC-qualified tools," explains Ole Kristian Kvarsvik, a Senior Engineer with Statsbygg.

**THE VARIOUS** building disciplines all contributed to the data model. When it was finished we were able to look at it and run a troubleshooting exercise. We discovered things like the fact that the ventilation shafts and the electric cabling 'collided' with each other and that a wall and a staircase were too close. Now we can correct such mistakes before the construction work begins. That means we save a lot of time and money on projects where budgets and time limits can easily overrun.

**"ASA** user you will not necessarily see any major changes in the applications you are using. The main difference is that you are always working on a shared model of the building. You can therefore make use of existing information about the project, and the information you add will be available to the other parties. As a basis for the building description, for example, you will be able to access masses and materials from the architect model. Changes in a design will automatically result in changes to the building descriptions and any calculations relating to the same object," says Kvarsvik. ●



**"This pilot points the way for Statsbygg's future efforts in the areas of planning, design, construction and facility management,"** concludes Statsbygg's Ole Kristian Kvarsvik.



**"Previously the different disciplines created their own drawings or models, now they work on the same building information model (BIM),"** says Janne Aas-Jakobsen, Director Built Environment, Jotne EPM Technology.



Waste water treatment plant

# Jotne in China

*As a result of Jotne Hollung's long-term focus on environmental projects in China, Jotne is now involved in a number of exciting projects in China, says Ole Martin Moe of Jotne Prosjekt.*

**CHINA IS** a huge and very interesting market, which is facing major challenges in the area of water and waste water treatment, as well as other environmental issues. The project which is closest to realisation is a drinking water treatment plan in Poyang, in the province of Jiangxi. This province is situated in southeast China and has around 45 million inhabitants. Poyang is a small town of some 160,000 inhabitants. The area has a relatively poor infrastructure, and investments in improvements are planned.

**JIANGXI PROVINCE** is also an interesting tourist destination. It has a rich cultural history and beautiful countryside. Poyang lake is China's largest freshwater lake and wetland area, with several smaller lakes surrounding it. This area is

on the WWF's list of important biodiversity conservation areas. It is also the source of the water that will feed the water treatment plant which Jotne is offering in Poyang.

**THE OTHER** project which Jotne Prosjekt is looking into is located in Luonan, in Shanxi province in northern China. This province borders Inner Mongolia and its high altitude gives it a climate similar to that of Norway. There are plans to build a sewage treatment plant and a district heating plant in Luonan, which lies not far from Xian, where China's famous terracotta army was discovered. The life-size terracotta warriors were buried near the grave of the Emperor Qin, who unified China in around 250 BC. The large-scale tourist traffic in this area has prompted the Chinese authorities to improve its infrastructure.

**THE PROJECTS** which Jotne are involved in will all have a strong link to Norway in the form of our product deliveries as well as funding by a Norwegian bank or Eksportfinans (Norwegian Export Credit Agency). China is developing rapidly and has a continuing need to improve its infrastructure outside the main cities. The large number of projects which have

already been initiated has led to a shortage of domestic investment funds and Norwegian financing will make it easier to start up more projects.

**IN THE** autumn of 2006 Jotne signed three letters-of-intent, and our expectation is that one or more of these will culminate in a final contract within the next 3-6 months. A network of agents are also engaged in uncovering potential projects based on Jotne's technology, and we therefore expect new opportunities to be added to the list in the time ahead.

**"JOTNE'S FOCUS** on China has a long-term perspective, and it will take time before the projects materialise. Nevertheless, we believe we are very close to a realisation, and that moving forward we will acquire a portfolio of ongoing projects," says Moe. ●



Roger Cielicki is Mng. Director of an expanding fabrication company. Even with a workforce of 90 Jotne Mekaniske is still famous for its flexibility and adaptability.

# Jotne Mekaniske Verksteder – a flexible fabrication giant

*Today Jotne Mekaniske Verksteder has 90 employees at its facilities in Halden and Fredrikstad. Typical for those employees is that they are flexible and used to pitching in to meet tight production deadlines.*

**COMPETITION FROM** Eastern Europe is fierce, also for the engineering industry. But the Eastern Europeans often attract the big, simple jobs with a long lead time. In response, Jotne offers just the opposite. The company is flexible and adaptable, and takes on assignments with short delivery times. Development projects are also part of its offering, although the bulk of its deliveries are traditional package solutions, mechanical equipment and steel constructions.

**GOOD IDEAS?**

**“SOME CUSTOMERS** want the products delivered almost before we get the order. Previously, we could spend three months completing an order. Today, we might have to produce the same unit within a month,” says Roger Cielicki, Mng. Director of Jotne Mekaniske Verksteder.

**“AT THE** same time, many companies come up with an innovative idea, but cannot see how to make

it work. At times like these, it pays to contact us. We are used to working with customers who have sometimes excellent general ideas, but no clear idea of how to implement them. In many cases, we can work in partnership with them to create a finished design that can be put into production,” he says.

**JOTNE MEKANISKE** Verksteder has a project department full of people who have worked their way up from the shop floor, acquiring superb analytical and design skills that enable them to create innovative solutions to a wide range of industrial design challenges. Roger Cielicki is a firm believer in developing his workforce.

**“AT PRESENT,** we have nine apprentices. A core part of their training is to get to know the company’s entire operation, and we send them to gain work experience in each of the company’s different departments. In this way, the flexibility and wide knowledge base

we depend on is bred into them from the very start.

**IN-HOUSE STAIR PRODUCTION MAJOR PRODUCTION** companies are important in their local communities, and Jotne is no exception. Cielicki heads a company with 10,000 sqm of production facilities in Industriveien and at Kråkerøy in Fredrikstad. In addition,

it has a 4,000 sqm modern production plant in Halden.

**“IN HALDEN** we make complete process units for the oil and gas industry. We also have a separate stair department, which accounts for 30 per cent of the facility’s business,” he concludes. ●

Father and son Bjørn and Richard Fredriksen enjoy working for Jotne Mekaniske Verksteder. They are pictured here testing equipment that is destined for offshore Angola.





Project manager Sten Rudolf Frebrich (left) and site rep Helge B. Holgersen from the Norwegian arm of the French customer Acergy are very pleased with the process so far. Now all that remains is testing and delivery.

for several months. Their inspectors have been in place during production and testing at the Fredrikstad site.

#### "SITE REP"

**IN ADDITION**, Acergy's Norwegian site rep, Helge B. Holgersen was also on hand. He was very pleased with what he saw during the process.

**"WE HAVE** total confidence that Jotne will deliver what they should. The good thing about this company is that the employees are not only extremely highly skilled, they are extremely nice to work with, too. They have such a degree of professional pride that they never let a defected weld go unnoticed or uncorrected. That is good for us to know when we hand the products over to BP," says Holgersen.

**"OUR PEOPLE** are used to having customers around the place the whole time. It is part of our working day," says Jotne Mekaniske Verksteder's Mng. Director Roger Cielicki. He is happy that everything has gone according to plan as the delivery date approaches. Work on the installation has taken six months.

**"THERE WAS** never any doubt about the deadline being met," says Holgersen. "Jotne delivers 'on time', which is crucial in this business." ●

## Deep-sea delivery off the coast of Angola

*Late 2006, in the middle of Fredrikstad, Jotne Mekaniske Verksteder is putting the finishing touches to an installation that will end up at the bottom of the sea off the coast of Angola. And there it will stay – and work – for 25 years. For Jotne it means the end of another successful and prestigious assignment.*

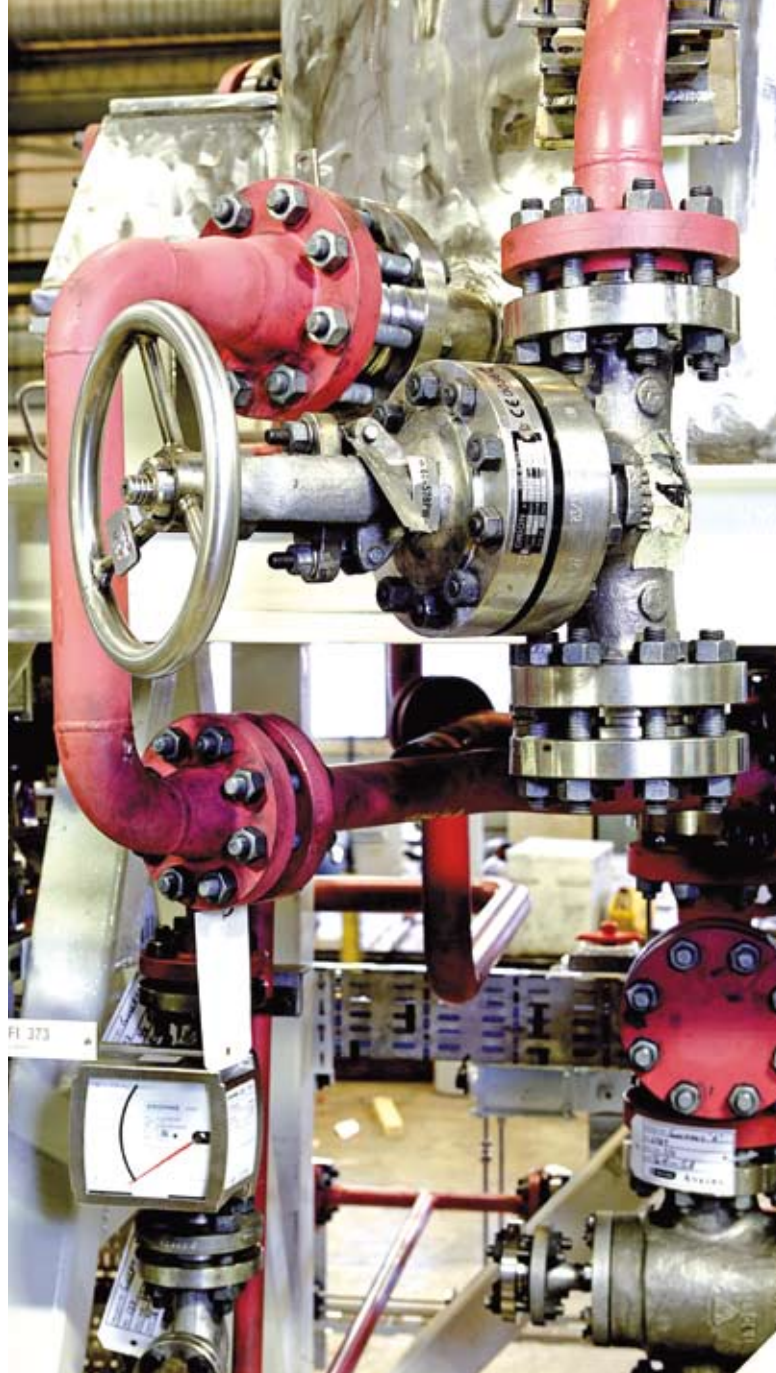
**A GROWING** percentage of Jotne Mekaniske Verksteder's output ends up at the bottom of the sea. Around 70 per cent of its business is for the offshore industry, with Aker Kværner among its biggest customers.

#### HIGH STANDARDS

**THE TREND** is for offshore oil and gas production to take place at ever increasing depths. A thousand metres below sea level is not unusual nowadays, and that places ever higher demands on quality and durability. At such great depths the pressure is so high that conditions are defined as extreme, and these kinds of products cannot be supplied by just anyone. The demand for quality at all levels is so stringent that Jotne Mekaniske Verksteder has had representatives for the French company Acergy, which is Aker Kværner's customer, on site



Process and equipment packages are complicated, and involve a lot of components and pipework.



and materials are chosen on the basis of experience and availability.

**JOTNE USES** all the calculation and design tools that are necessary for calculation, analysis and 3D modelling. We have a well-filled toolbox, which is continuously updated and maintained. The package concept is developed and discussed with the help of a 3D model, which forms the basis for analysis and stress calculation of piping and structures, as well as global weight and collision impact. With an increasingly short lead time from design to finished product, it is crucial that the design process is fast and effective, so that manufacturing can start without delay.

**RECENTLY, THE** market for equipment packages has changed somewhat. The trend is moving away from deliveries of large-scale process packages on fixed installations, to the construction of floating production units (FPSO, MOPU), ie process modules installed on a ship's deck. These process units often have a smaller capacity and size than those we are used to from the large platforms. Construction specifications are often slightly less rigid in their definition, with fewer requirements for documentation. Equipment construction codes are, however, the same. The end-users are shipping companies, and the time from the start of a project until the first oil or gas is produced, is cut dramatically compared with traditional platforms. The delivery time for equipment packages is also reduced, which can be done if time-saving processes are kept fully in focus, such as a less red-tape, less documentation and shorter lines of authority.

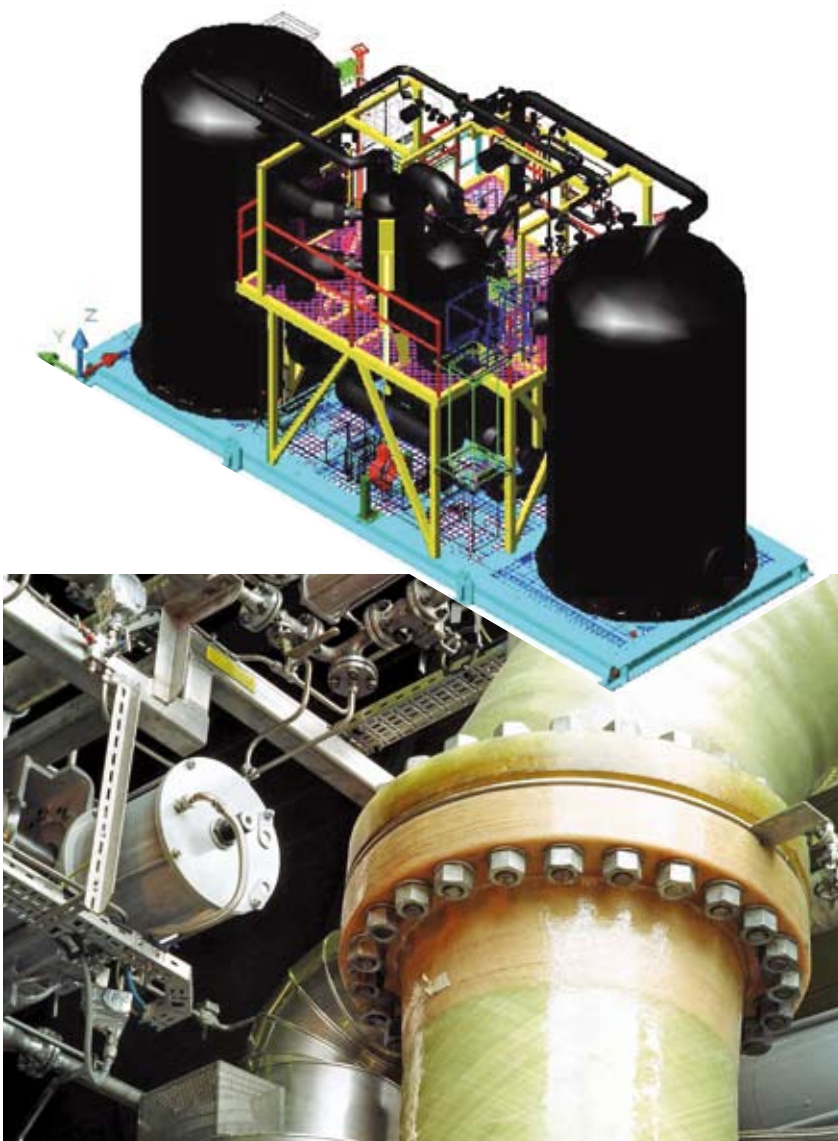
**IN 2005** Jotne's competence as an oil and gas package supplier resulted in the company winning a contract from Dresser-Rand to assemble gas turbine driver packages (see separate article in this edition). Gas turbine driver packages are very similar to the packages Jotne supplies to the oil and gas industry. On the other hand, they afforded a whole lot of new challenges, particularly with respect to rotating equipment. For example, the tolerances required for rotating parts and the demands for an internal gas-free environment. The supply of equipment packages like gas turbine drivers confirms Jotne's position as a knowledgeable and versatile partner. ●

# Jotne supplies complete packages

*With its many years of experience and diversified industrial offering, Jotne is a leading supplier of process and equipment packages to the Norwegian offshore industry. Over the past 20 years Jotne has been responsible for more than 100 package deliveries from its facilities in Halden and Fredrikstad.*

**COMPLEXITY AND** size vary, from small pump skids to large gas-drying packages with a dry weight of over 70 tonnes. The function of the packages can also vary considerably, from removing moisture from oil and gas to reducing the oil content of water. For example, the purpose of a test separator package is to carry out a test separation of gas and liquid, which give the oil company the information it needs about the reservoir and the amount of oil, gas and water produced.

**JOTNE PARTICIPATES** in every phase from concept definition and design to finally tested package. Conceptual design solutions and detailed design plans are discussed and agreed with the customer. Through this process Jotne provides the customer and process owner with valuable insight in the form of cost-reducing manufacturing solutions, practically oriented design details, as well as the best choice of materials. This kind of work process makes the final product cheaper, since the best design solutions are selected, costly work processes are avoided



The pictures above show one of the two water treatment packages which Jotne designed, manufactured and tested. The packages are now in place on the Bonga platform off the coast of West Africa.



A 7 MW Hydraulic Power Unit, designed and built by Jotne. The unit generates electricity for a drilling rig.



Some of Jotne EPM Technology's international operations.

## Jotne EPM Technology intensifies its international activities

*EPMT has taken part in standardisation meetings, trade fairs, exhibitions and seminars for many years. In 2007 we will be intensifying this effort, which includes membership of various organisations, such as buildingSMART, ISO, PDES Inc, OASIS, POSC Caesar, etc.*

**OUR ACTIVITIES** will include presentations to the European Space Agency (ESA) in the Netherlands, meetings in Valencia, Milan and Washington DC (DC (buildingSMART), an EADS MIMER demo in Germany, an ISO STEP meeting in Pennsylvania, as well as a presentation at the Aerospace Design Expo in California.

Construction and Property), DNV, the Norwegian Armed Forces, Selvaag Gruppen, ESA, EADS, Airbus, Shell, Lockheed Martin, Northrop Grumman, Rockwell and US Department of Defense (Army, Navy and Air Force). ●

**JOTNE EPM** Technology supplies solutions for the transmission of large amounts of data, as defined by ISO 10303 (STEP, PLCS), ISO 15926 (OIL&GAS) and ISO 16739 (IFC). EPMT's products have been sold to a number of countries, as well as to leading companies and organisations, such as Statsbygg (Directorate of Public

# Space – a promising new market

Business development where gravity does not apply

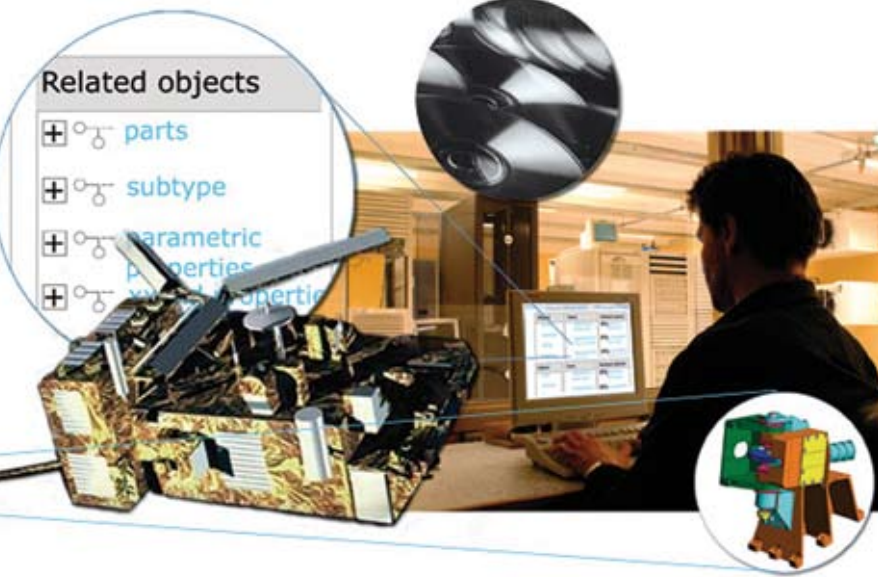
**SINCE 2002** Jotne EPM Technology has focused heavily on the sale of technology to Europe's space industry, and the Norwegian Space Centre has played an important role in helping to establish contacts with the European Space Agency (ESA). The company is working to become a key supplier of communications and archiving solutions for ESA's future programmes, as well as to Norwegian follow-up projects.

"**SPACE IS** a business area that has developed particularly strongly in the past year," says Jorulv Rangnes, Mng. Director of Jotne EPM Technology. "It is particularly pleasing to see the Norwegian government's proposed national budget for this year confirms the authorities' commitment to high technology, where our products and services are in demand. In our experience, the success of a project is immeasurably bigger

if the authorities and industry join forces in a common effort."

**ESA USES** Concurrent Design Facility (CDF) for planning and carrying out its operations in space. CDF is currently used by space organisations and industry in the early stages of their development programmes. Through the technology development project Open Concurrent Design Server, ESA aims to scale up the solution to cover additional project phases and make it more widely available through close links between the various parties' own technical applications and ESA's project database.

**ESA HAS** chosen to collaborate with Jotne EPM Technology because of the company's unique support for open and public avail-

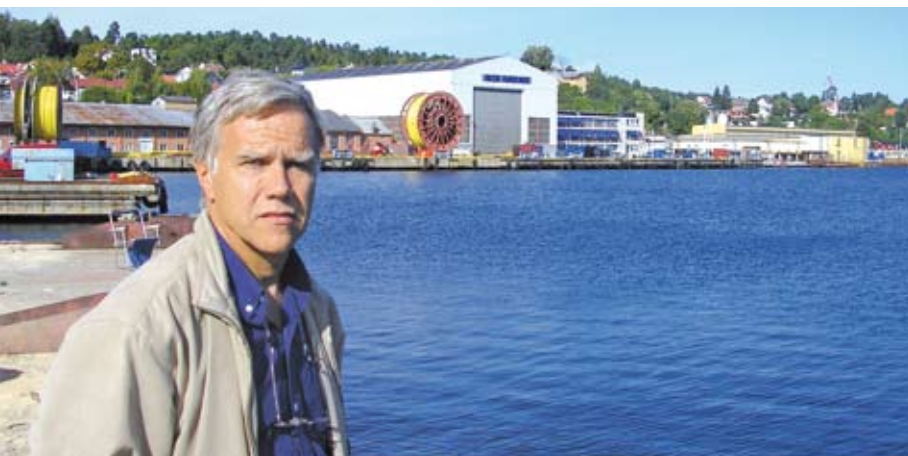


able industrial standards and technology which has been well tested in many other industrial sectors. ESA has engaged EPM's services with respect to standardisation, the development of interfaces for technical applications, as well as the evaluation of technologies and infrastructures – all in preparation for a future system for electronic interaction.

**JOTNE EPM** Technology supplies a database product with data communication, information quality assurance and long-term archiving capabilities. ESA and the Norwegian Space Centre are about to enter into a collaboration with the

company in order to document all aspects of the product for simulating and optimising satellites prior to launch and, not least, analysing error situations which may arise several years later, where it is necessary to access information irrespective of whether the original technical applications or engineers are still around or not.

"**ACCESS TO** ESA contracts has increased our technological lead and will bring new products to users, while at the same time considerably increasing our customer base," says Kjell Bengtsson, Marketing Director of Jotne EPM Technology. ●



Jotne's Dagfinn Yggeseth has extensive experience of the offshore industry, and plays an important role in Aker Kværner Subsea's umbilical testing.

## Thorough testing of umbilicals for Aker Kværner Subsea

**Dagfinn Yggeseth from Jotne EPM Consultants has no time to put his feet up at Aker Kværner Subsea's umbilicals division. He commutes between engineering assignments at Lysaker and testing in Moss.**

**UMBILICAL IS** the term given to a cable, normally consisting of both hydraulic pipes and electrical wiring, which transmits hydraulic pressure and electrical signals from fixed or floating platforms to subsea installations. The umbilical is crucial to the offshore industry's ability to operate its subsea installations. Which makes it imperative that it works the way it should. Dagfinn Yggeseth's main task is to carry out full-scale testing of these umbilicals.

"**WE RUN** a test programme which is individually agreed with the cus-

tomers. This programme is based on an ISO standard. During testing we assess quality and life expectancy, and confirm that the umbilical has been manufactured according to the agreed specifications."

**SEVERAL KILOMETRES** of umbilical are necessary to operate many subsea installations. It is a constant race against time as limits are pushed back and ever increasing depths are reached. "The equipment is subject to powerful forces, so it is important that it is thoroughly tested to confirm its quality before the delivery can be

approved," says Yggeseth.

**THE TEST** team's job is to carry out a complete test programme, ie buy and install the necessary equipment, draw up a set of test procedures, conduct the actual test and write a report. All the tests are carried out by Aker Kværner Subsea, most often in the presence of the customer. The umbilicals, which can have a diameter of 70 mm to 200 mm, are supplied to companies such as Statoil, Total, Exxon and other major international operators. ●