



Value creation

Partnership

Integrated solutions

Attitudes

Globalization

2002 Annual Report



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From Knowledge to Value

Knowledge only becomes relevant when it is utilized, and that is why we attach significant importance to the continuing process of generating knowledge and converting it into value. At FORCE Technology, we make great demands on our application of technologies and on our staff. We do this through a constant development and expansion of our core competencies, adding new concepts and developing and maintaining a corporate culture and a working environment in which motivation, flexibility, cooperation, professionalism and social responsibility are keywords.





Our vision

FORCE Technology aims to be the preferred partner for industrial and service organizations in the private and public sectors when it comes to developing and converting highly specialized knowledge into value-creating activities.

We aim to do this by utilizing science, technical expertise, technology, innovation, creativity, flexibility, documented experience and an international network in integrated concepts and solutions that support the business and societal goals of our customers.

At FORCE Technology, we put our key competencies at the disposal of customers and collaborative partners who require value-creating consultancy and solutions based on trust, cooperation, quality, security and constant innovation. We do this from a starting point of strong management and a team of the best specialists combined with sound business practice.

Our business areas

FORCE Technology provides consulting and other services to public- and private sector businesses in many different industries and markets. We focus on product and concept development and the design, production, operation and maintenance of industrial systems within the following areas:

- Optimization and automation of production and processes
- Materials utilization, protection and analysis
- Inspection, testing, calibration, verification and certification
- Maritime technology
- Sensor technology development and applications
- Management systems optimization and development

Our competencies are built upon a solid foundation of more than 60 years of experience in the innovative development and application of knowledge and technology. We offer our customers a unique competitive advantage through the development of flexible, innovative and value-creating solutions based on a close and confidence-inspiring collaboration that creates value for both parties.

To put it briefly, we want to be a part of and contribute to integrated projects and concepts that involve in-depth technical knowledge and create business value for our customers and collaborative partners in the countries and markets in which FORCE Technology offers its services.



Management Report





Continued success and growing activity in a weak market



Ernst Tiedemann
Managing Director

The year 2002 was a turbulent one for most consultancy and innovation enterprises in Europe. The general decline in trade and industry has left a profound mark on the consulting and services industry in both employment and earnings, and many planned projects were shelved. In addition, the generally low level of activity in the global business world has also resulted in a decline in the number of technological service and innovation projects that have traditionally been a vital area of focus and business for FORCE Technology.

Seen in this somewhat gloomy light, FORCE Technology has good reason to be satisfied with its turnover for the year, which is once again higher than the year before. It documents the fact that our company, in spite of the global market decline, has chosen and continues to pursue a sustainable strategy with an increased focus on knowledge-intensive and consulting projects – without, however, giving less priority to the infrastructural technical services we also provide. And this strategy has shown to be successful.

FORCE Technology ended the year 2002 with a consolidated turnover of DKK 568m, up DKK 78m from the year-2001 figure of DKK 490m. This represents a growth of more than 16%.

Consolidated profit for 2002 amounted to DKK 18.1m, versus DKK 25.4m in 2001. The lower profit figure was due to our continued high level of investment in the development and implementation of new business concepts and a poor earnings capacity within one of FORCE Technology's new business areas and fields of competence.

Turnover from operations in Denmark increased from DKK 408m in 2001 to DKK 473m in 2002, which corresponds to a 16% rise. This gain is primarily due to the merger of FORCE Technology with Danish Maritime Institute, which took place on 1 January 2002.

For FORCE Technology Sweden AB, turnover rose from DKK 89m in 2001 to DKK 105m in 2002, the best-yet performance by this subsidiary. With an 18% increase in turnover, our Swedish operations contributed to group financial results with their DKK 4.3m in profit for 2002, which represents an increase of 15% over the year-ago figure.

FORCE Technology merges with Danish Maritime Institute

FORCE Technology and Danish Maritime Institute (DMI) merged with effect from 1 January 2002. With FORCE Technology now boasting a larger organization and even more core competencies at a highly respected and international level, Danish and international industrial companies and public authorities now have access to an even broader spectrum of consulting and other services. DMI is today fully integrated in FORCE Technology.



Erik Søndergaard
Chairman of the Board

These two knowledge-intensive and highly specialized firms found a both strategically and commercially sensible merger model with highly promising prospects of real synergies. DMI added to FORCE Technology internationally and highly respected core competencies within fields such as consultancy and simulator-based training and software, especially for customers in the maritime sector – as well as a business with a strong customer base and most of its activities on pertinent and attractive markets abroad. In addition to its customers in the maritime sector, DMI brought to the merger an excellent customer portfolio within other sectors and industries such as construction, transport and machinery.

Exciting business perspectives

With the merger, FORCE Technology will be able to realize more quickly its goal of strengthening business activities within knowledge-based consultancy, design and project planning – and thus also support our ambition to supply more value-based and value-creating services to a wider circle of customers.

With the addition of resources and competencies from DMI, we had great expectations that we would be able to reap the financial benefits of our broader spectrum of competencies and services and access to a wider circle of customers in Denmark and abroad.

However, developments in the year 2002 were not as favourable as expected within DMI's traditional business areas, with the maritime sector suffering difficult times at a global level while also being considerably affected in general by international market fluctuations.

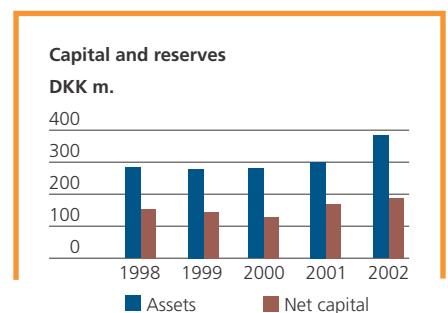
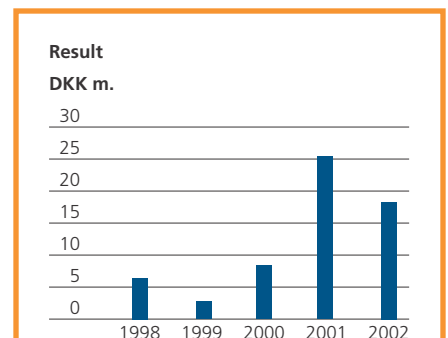
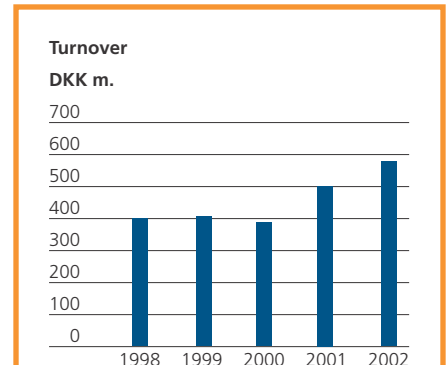
Financial highlights of 2002

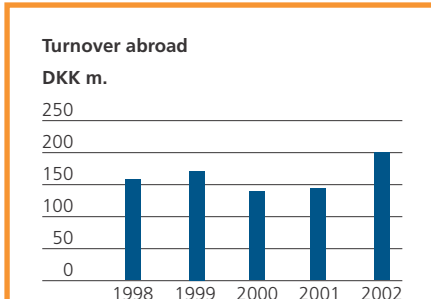
All in all, the merger with DMI made a substantial contribution to FORCE Technology's turnover in 2002. However, our financial results also reflect the fact that the costs incurred in connection with the merger were considerable, and that earnings from the operations of the acquired company did not live up to expectations. These are the reasons why FORCE Technology was forced to record a drop in the Concern's total profit for 2002.

During the year, then, FORCE Technology adapted its resources within DMI's traditional business areas, and we now anticipate that our business activities in the maritime sector and related fields will add to FORCE Technology's profits in 2003.

Our strategy to adapt FORCE Technology's consulting services, design and project management skills, products and service concepts to better satisfy our customers' commercial needs 'higher up' in the value chain is paying off.

It is the assessment of FORCE Technology's management that the expectations we had to synergies arising from the merger are still realistic, but these favourable results will show up only after a moderate delay as a consequence of the downward trends in the global business climate.





All things considered, the year 2002 proved that our long-term strategies are sustainable, and our efforts to qualify our organization to work in a more business- and market-oriented manner are showing good business results. Our continuing endeavours to develop our organization provide us with exactly the dynamism and flexibility that allows FORCE Technology to manoeuvre in an international marketplace where almost every industry and sector is affected by the shifting market trends. This can be seen from, among other things, the fact that FORCE Technology is handling an increasing number of turnkey contracts.

An innovation- and development-based business area

Discussions in professional circles continue about the need for and values of research funded by the public sector, e.g. within the framework of what in Denmark are known as GTS institutes, or authorized technological service institutes.

We at FORCE Technology believe that the new act passed by the Danish parliament on 1 July 2002 will open the door to a more liberal access for different types of organizations that will be permitted to 'perform authorized technological services'.

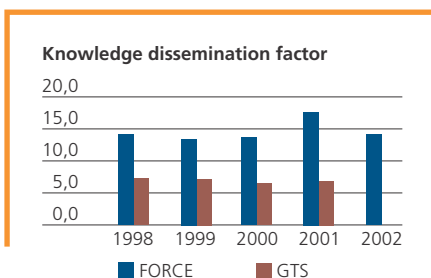
In this connection, it is vital for FORCE Technology to continue its strategic focus on increasing activities performed for and collaborations with the business community and society in general. Thus our objective is to maintain our position as a preferred collaborative partner when there is a need to develop and share highly specialized knowledge that creates value for them and for society.

The global trend in recent years is towards large, highly specialized research- and knowledge-based businesses – and a commercial orientation will increasingly be prerequisite to the ability to carry out research and development at a high level.

It is our goal to be at the leading edge of this trend and to position ourselves as value-creating partners that continue to help drive progress and good financial results for our customers. At the same time, we aim to grow our knowledge base in order to utilize the obvious synergies between commercial and societal interests.

We at FORCE Technology will continue our efforts to optimize our organization with respect to both competencies and business, in order to retain our ability to meet the changing demands and needs of the market for technological innovation within our prioritized fields of activity.

Thus FORCE Technology will, also in the years to come, pursue its strategy to create growth in its fields of competence, in the size of its business and in its financial results. The foundations of FORCE Technology remain unchanged, strong and solid: a competent and highly motivated staff of more than 800, a strong and goal-oriented management, advanced technologies and flexible working processes, with a focus on creating value and delivering quality at all levels.



Ernst Tiedemann
Managing Director

Erik Søndergaard
Chairman of the Board

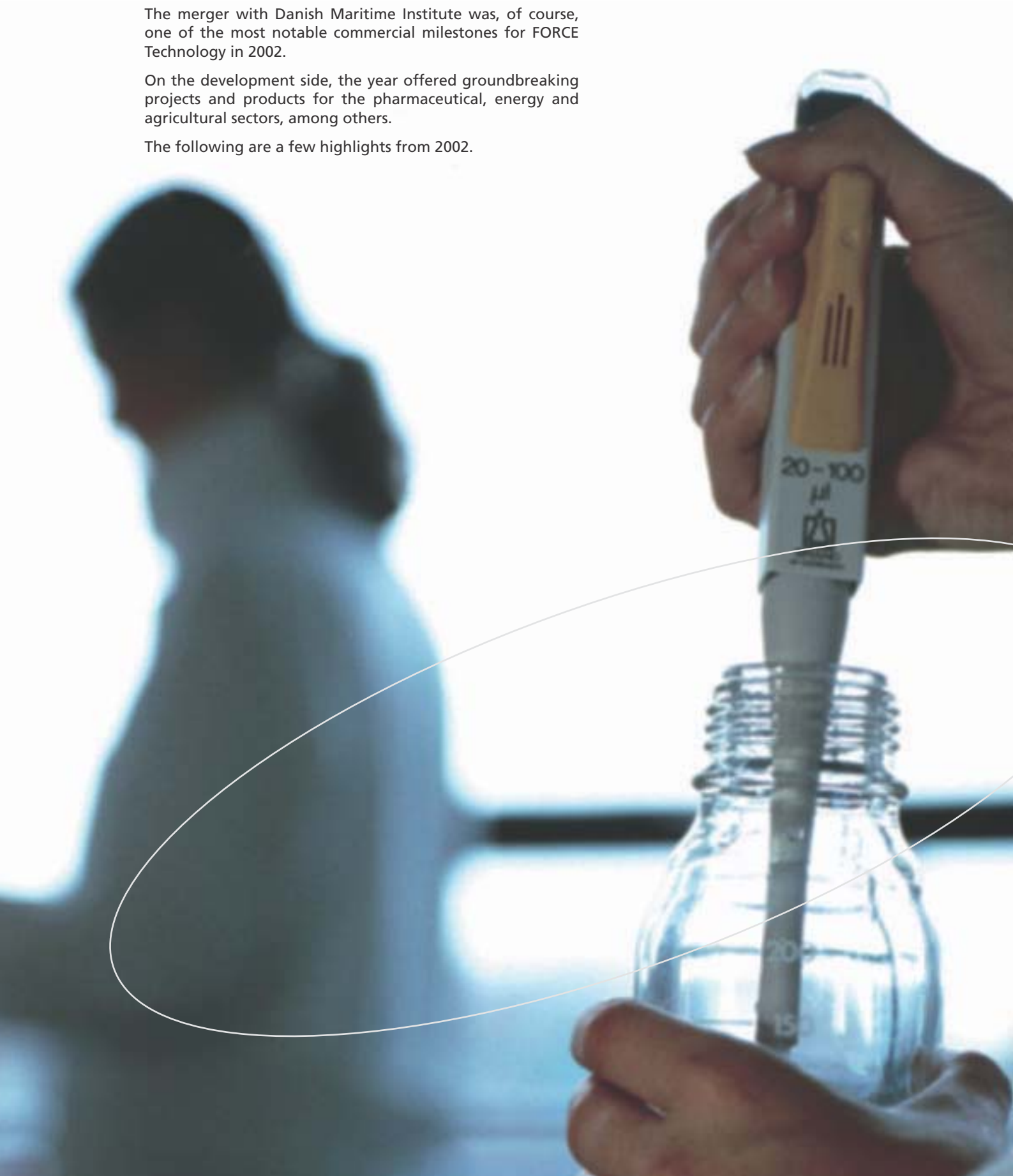


Milestones for 2002

The merger with Danish Maritime Institute was, of course, one of the most notable commercial milestones for FORCE Technology in 2002.

On the development side, the year offered groundbreaking projects and products for the pharmaceutical, energy and agricultural sectors, among others.

The following are a few highlights from 2002.





EN ISO/IEC 17025: New international testing standard

The adoption of shared guidelines for testing laboratories, metrological laboratories and chemical analysis laboratories all over the world now forms a sound basis for the certification of test results sectors, among others on a global scale, which will make international trading easier.

FORCE Technology played a central part in drafting this new standard and was able to influence it in such a way that it is now also acceptable seen from a Danish point of view.

All of our laboratories worked hard in 2001 and 2002 to adjust their quality systems and work methods so they today function in compliance with the new standard. Those of our laboratories that were already accredited by DANAK under the previous standard received accreditation in accordance with EN ISO/IEC 17025 by the end of 2002.

Environmental certification of Elsam

One of our largest environmental certification jobs in 2002 was for the energy company Elsam. FORCE Technology's certifying body FORCE-Dantest CERT environmentally certified all Elsam's central production systems in accordance with the DS/EN ISO 14001 environmental standard: the company can now boast of an environmentally sound production of electricity and heat. Elsam's environmental control system will be expanded over the next two years to also include waste-fired plants, decentralized plants, wind turbines and even working conditions at the company's facilities.



FORCE-Dantest CERT authorized to certify pressure equipment

In 2002, the Danish Working Environment Service authorized FORCE-Dantest CERT to certify all pressure equipment. This means that we can now help our customers by providing accredited testing, type approval, production systems approval, welders, welding procedures, NDT staff and final inspection of the finished pressure equipment.

New ultrasonic pipeline inspection equipment

FORCE Technology has purchased sophisticated ultrasonic pipeline inspection equipment that enables inspection at the impressive speed of up to 100 metres of pipe in just a few hours. The advantages of this new equipment are clear: corrosion and leaks can be found before they become major problems, and inspections can be performed within much shorter time frames. This saves our customers – typically refineries and the chemical industry – considerable expenses.

Tested at offshore platforms and refineries, the equipment consists of an inflatable or solid ring with ultrasonic transducers that is clamped around the pipe to be inspected. The transducers send ultrasonic signals in both directions in the pipe walls, and the results are sent to advanced software installed in a computer. After the data is processed, our staff can easily determine whether there are leaks or corrosion in the pipe.

International welding conference in Copenhagen

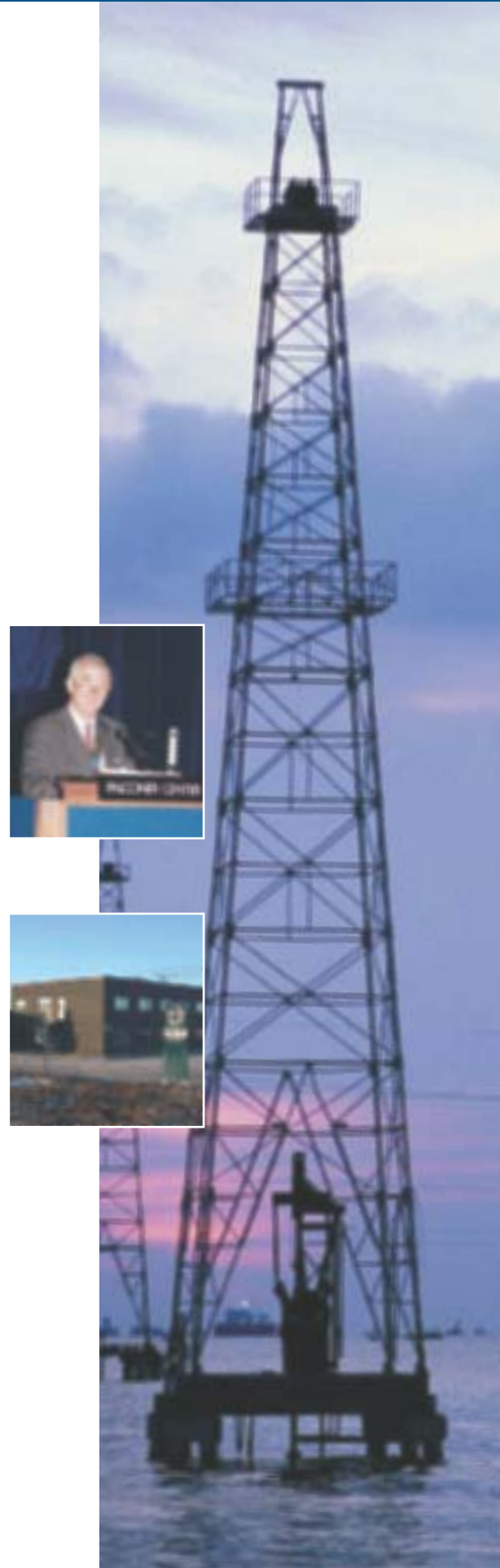
FORCE Technology hosted the 55th Annual Assembly of the IIW (International Institute of Welding) in Copenhagen on 23-28 June 2002, where roughly 600 attended. The IIW's Annual Assembly is an international event at which welding experts from more than 40 nations meet each year to exchange experiences and research results, to network and – not least – to sign new collaboration agreements. The conference in Copenhagen was a unique chance for the Danish welding industry to learn about the newest advances in welding and related technologies.

New office in Aarhus

On 9 December 2002, we moved our Aarhus office to 1200 m² premises in a newly constructed building.

Recent years' growth has brought an increase in the number of employees and guests that made it clear we needed more room. In practice, the new premises have made it possible to gather a strong group of committed professionals, who are supporting and supplementing each other's competencies and know-how. As a result, we now have under one roof consultancy knowledge and know-how spanning from materials selection and joining to testing and inspection. Lifecycle testing of power and process plants and actual failure investigations will also be handled by the staff of our new Aarhus office in the future.

The new premises also include sufficient space for larger and better conference rooms in which we can hold a wide spectrum of courses. Our new address is FORCE Technology, Tueager 3, Skejby, 8200 Aarhus N, Denmark.





Expanded calibration services

Effective 1 July 2002, FORCE Technology acquired German-owned calibration company Calib ApS. With this move, we expanded the services we provide to also include calibration of mobile weight systems mounted on refuse-collection trucks and tank trucks, for example.

Calib was originally formed to handle accredited verification and calibration work for the Danish company Dansk Mejeri Elektronik, but it was later taken over by German-owned Diessel Mobile Electronics A/S. These activities will continue to be handled, as before, by staff at their office in Hinnerup near Aarhus, where Calib originally created its own niche in verification of weight systems mounted on lorries and tanker trucks.

New aluminium handbook

For the general purpose of spreading information about the use of aluminium and to give Danish industry the opportunity to design aluminium structures more efficiently, we at FORCE Technology have contributed our expert knowledge to a new handbook.

Entitled SASAK Aluminiumshåndbog (in Danish only), the book is based on the experience gained from a project commissioned by the Danish Maritime Authority. The project was funded by the Danish national Agency for Enterprise and Housing and a consortium whose members were the Technical University of Denmark, Aalborg University, HMK Bilcon A/S, Migatronik A/S, Maersk Container Industri A/S, Knud E. Hansen A/S and FORCE Technology.





The handbook is aimed at companies and people who already work with aluminium or intend to work with this material. In order to reach as wide an audience as possible, the book contains information of both a theoretical and a practical nature in varying degrees of detail.

New safety sensors tested in Atlantic gale

A project to develop a sensor to monitor the wave load on ships and ship stability has moved into a crucial phase. FORCE Technology is behind the development project, along with A.P. Møller, the Danish Naval Materiel Command, Lyngsø Marine and others.

The sensor monitors wave height, deck washover, water penetration and structural loads and thus provides valuable information that helps decision-makers in critical situations, e.g. a ship in rough weather or if water is leaking through the hull. Demonstration models of the sensor were tested in 2002 under realistic conditions on a container ship in a gale on the Atlantic, and they fully lived up to specifications and expectations. The first sensor is expected on the market at the end of 2003.





Scandinavian submarine project is surfacing

Denmark, Sweden and Norway joined forces in 2002 to develop a new type of submarine that will not only safeguard the national interests of these countries, but will also be used as an invisible intelligence-gathering unit during times of international conflict. Named "Viking", the project involves the Danish shipbuilder Odense Steel Shipyard A/S. As a sub-supplier to Odense Steel Shipyard, FORCE Technology contributes to welding and production aspects of the project, as well as pricing the submarine. FORCE Technology's production optimization expertise is also intended to ensure that the financial investment is kept as low as possible – far below the traditional market price for similar craft.

If the project is realized and subsequently progresses as planned, the first Viking submarine will be ready in 2009.

Improved Danish polymers

Polymer materials are a crucial component of the products of many Danish companies. It is of vital importance in competitive markets that companies learn about the situations – desirable as well as undesirable – that may affect the durability of their polymer products. For this reason, an ambitious Danish project by the name of "MONEPOL" has been implemented by FORCE Technology, the Danish Polymer Centre and leading Danish companies such as AVK Gummi, Danfoss, Grundfos, LEGO Engineering, NKT Flexibles, Novo Nordisk, Maersk Medical and Radiometer Medical. By focusing on degradation mechanisms in polymers, the project is intended to help Danish companies make optimal materials choices faster and with greater reliability than before. The project is expected to be finished by July 2005.

FITNET: Help for European industries

The European network FITNET (FITness-for-service NETwork) was recently established with the objective of developing and extending the use of fitness-for-service procedures and standards throughout Europe. Sixteen European countries have joined FITNET; Denmark is represented by FORCE Technology and Innospexion ApS.

Flaws- such as crack, welding defects and corrosion damage – can arise during the manufacture and/or use of metallic components. For safety-critical items such as aircrafts, pipelines and pressure vessels, the failure of a single component due to the presence of a flaw can be at high expense. However, not all flaws are critical, as they may not necessarily lead to failure during the lifetime of the component and replacement and/or repair of such flaws are economically inexpedient. The fitness-for service procedure allows flaws to be evaluated consistently and objectively, using fracture mechanics principles. FITNET is slated for completion in February 2006.

Environmental management to improve Poland's metal industry

With its entry into the EU fast approaching, Poland is well on its way to becoming one of Denmark's largest trading partners. With a view to improving the competitive ability of Polish trade and industry, the Danish National Agency for Enterprise and Housing has started an environmental engineering project at eleven Polish companies in the metal industry. FORCE Technology heads up the project in a collaboration with engineering consultants COWI A/S Denmark and COWI Polska. The purpose of the project is to improve environmental conditions in the production units of the companies in question and to make staff more environmentally aware through training, education and seminars. The project should result in a certification of the companies in question in compliance with the ISO 14001 international standard.

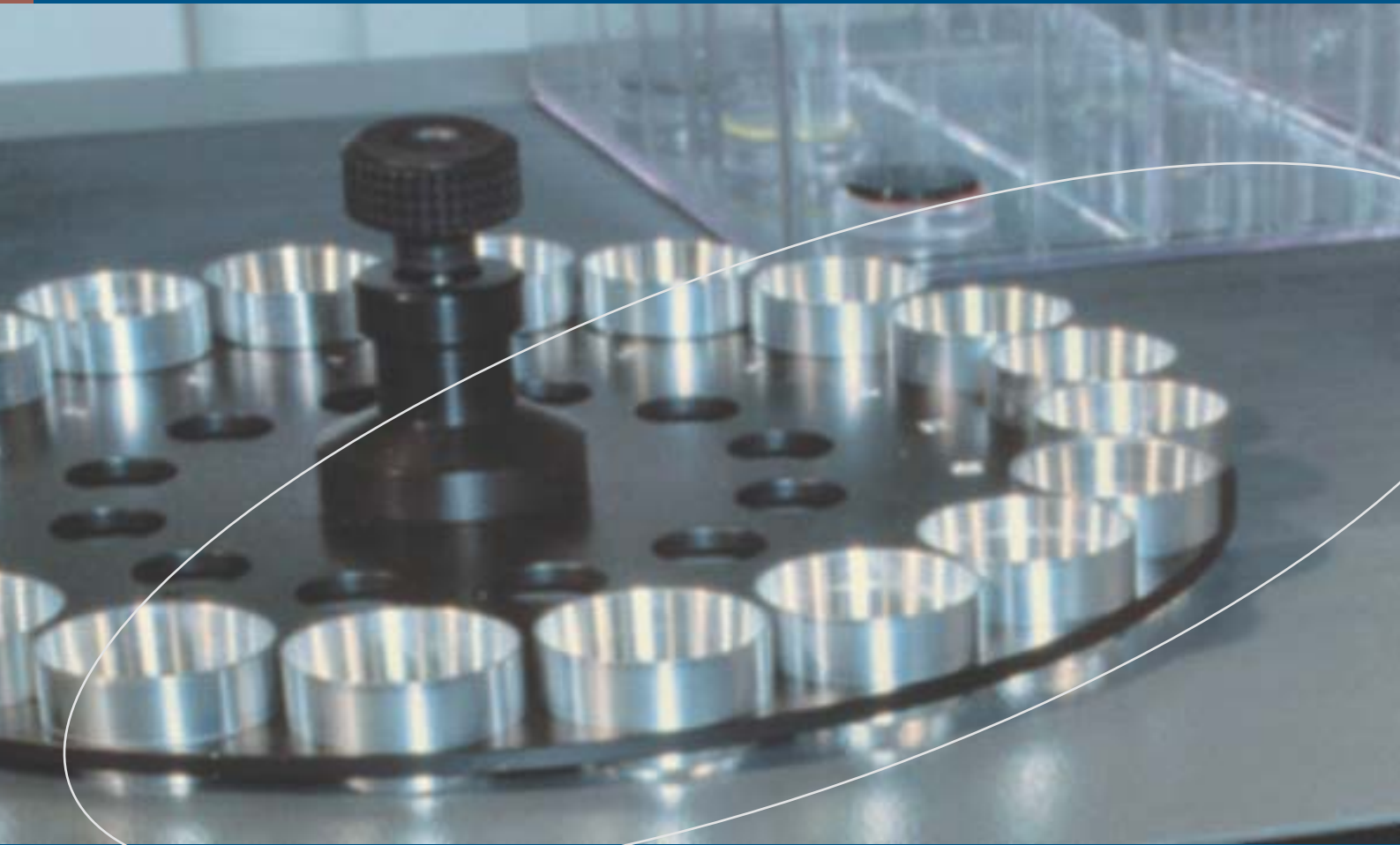




New collaboration releases customer resources

FORCE Technology and dk-TEKNIK are working together to give small and medium-sized enterprises access to a wide spectrum of consultancy expertise from a single source. This allows customers to minimize the number of suppliers and consultants they have, thus releasing resources for investment in more targeted efforts to develop their own core competencies.

Both dk-TEKNIK and FORCE Technology have a good contact with these firms and almost the same target groups as well. The collaboration coordinates the expertise of FORCE Technology and dk-TEKNIK in the optimization of company processes in the planning and operational phase and the reduction of energy consumption and environmental load. The synergy effect in our collaboration lies in the fact that we can offer our customers a complete assessment of the cost of planning and maintenance of systems and their life-times.



Quick and precise analysis of materials composition

FORCE Technology has invested in a new and advanced X-ray fluorescence (XRF) system that can make rapid and exact analyses of just about any kind of material. XRF can be used to determine the composition of metal alloys, for example, or the concentrations of heavy metals in plastic or soil, as well as to analyze liquids, e.g. determine the concentration of heavy metals in paint or levels of sulphur in oil. The method is especially remarkable for its ability to detect very low levels of various elements quickly and precisely.



New technology reveals hazardous waste



FORCE Technology has developed a new technology that allows waste sorting that is far more efficient than any method used before. A sensor is used that identifies hazardous products such as pressure-treated wood, cadmium batteries, PVC and other chlorine-containing plastics hidden in huge amounts of waste. Based as it is on the principle of gamma-neutron activation, the sensor is expected to gain wide use in waste sorting, incineration and recycling plants.

Precise thickness-measuring equipment saves money



FORCE Technology has developed a precision fibre-optic device called the OCT22. The new system was developed especially for determining the thickness of transparent and semi-transparent materials online, but is also ideal for determining the thicknesses of individual layers in layered materials and for measuring the thickness of glass plates, paper, plastic films and polymers online.

The system is based on an interference principle and, unlike other types of scanners, contains no moving parts. This makes for a much shorter scanning time compared with traditional mechanical scanners. The results are tangible: great savings in materials and simpler production management systems for customers.

Sustainable technology reduces risk of illness



FORCE Technology is working on two projects whose purpose is to develop sustainable technology for the agricultural sector.

One project is the development of a sensor and an intelligent data processing program that rapidly and accurately determines the fat content in the livers of highly productive dairy cows as part of the effort to keep the cattle disease-free.

The second project targets the development of sensors that can track fungal growth and aphids on crops to allow a more targeted use of less pesticide. The pests are found by employing a smell sensor or "artificial nose" that identifies the substances the aphids give off.



Both projects are being carried out in collaboration with the Danish Institute of Agricultural Sciences.



Customer Cases

Satisfied customers are the driving force behind our desire to be the preferred consultant and collaborative partner for our national as well as international customers. What they want and need are customized solutions that improve their competitive ability and their results. That is why we at FORCE Technology have aimed our focus even more towards developing innovative solutions in a closer collaboration with each individual customer. We support this collaboration with substantial investment in research and development into more efficient manufacturing processes, sustainable products, etc.

The year 2002 saw us involved in many exciting projects, including also projects based on our new forms of collaboration, with truly excellent results. A high degree of innovative thinking and the development of new technologies characterized these projects. We present the following seven different projects, which best presents our new collaborative concept, a concept that focuses on the creation of value for both parties.





Less mistakes with Human Factor Management

Human Factor Management (HFM) is a new business concept launched by FORCE Technology in 2002 intended to increase safety and efficiency at workplaces and among employees.

Less-than-optimal efficiency and – in the worst case – accidents at the workplace are often due to human error: people lack experience or understanding of the way work processes are interconnected, or it may be due simply to bad communication, e.g. in stressful situations. Circumstances that can cause direct or indirect losses to the company and/or injury to the employees.

HFM is based on the idea that systematic intervention in a given work process can, together with additional training and education, strengthen human resources. Experience has shown that this increases a company's efficiency and provides better safety at the workplace. At FORCE Technology, we have been developing HFM for many years, although primarily in the maritime sector. After our merger with Danish Maritime Institute, we can now offer an integrated HFM programme to our customers in all industries and sectors.

Energi E2 A/S Avedøre Power Station invests in Human Factor Management

The Danish production and energy trading company Energi E2 is one of the companies that has invested in HFM for its Avedøre Power Station with the purpose of achieving efficient and safe operations in all its work tasks and functions. The Avedøre Power Station also wanted to improve communications and work relations among the employees.

FORCE Technology developed a customized HFM programme, which gave the employees the opportunity to update their theoretical knowledge as well as improve their skills in handling the human factors that can lead to error, injury or damage. One of the methods employed was workshops that helped anchor the new knowledge and make it applicable for the employees.

The training process at the Avedøre Power Station plant is an ongoing process, so it is too early to take stock of the aggregate benefit. However, both the power station and FORCE Technology anticipate that the programme will be of vital importance in connection with the shift workers who monitor and control the heating and power generation systems. One of the high-priority goals is to improve communications between the different shifts when the leaving shift briefs the shift coming on duty. The power station also hopes to reduce the many disturbances that arise as a result of visitors and telephone calls to the plant, with the project also focused on improving staff awareness and understanding of different situations and thus reduce the chance of mistakes and misunderstandings.



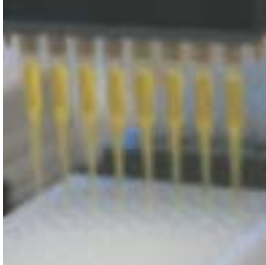


For the project to provide the best possible results, it is vital that new competencies are continually supplied to Avedøre Power Station staff during the entire process. An educational programme is aimed at giving the employees a greater insight into their own performance and the factors that can have a negative effect on their performance. As a part of the changes being made, it is vital to create the framework for a corporate culture in which employees can freely report and handle their own mistakes so that errors can be minimized for the benefit of the workers as well as the power station.

Expertise and quality control in the same solution

FORCE Technology's ambition to expand its unique validation and qualification concept into new markets and industries is off to a good start. The concept helps improve the quality of a company's products, and Danish pharmaceuticals manufacturer H. Lundbeck A/S has with highly successful results employed it.

It all started with Lundbeck wanting a collaborative partner who could offer not only highly specialized technological expertise, but also an actual validation in accordance with the American Food and Drug Administration's requirements. Validation standards in the pharmaceutical industry are strict, especially for products to be sold to the American market.



FORCE Technology's approach to the problem was to focus on three main areas: maintenance in the form of lifecycle costs and other parameters, a focus on optimizing Lundbeck's supply systems, and dealing specifically with process validation for pharmaceutical products.

The project resulted in new innovative solutions, with two of the strong points: a substantial improvement in several works flows and a higher level of safety for Lundbeck employees. Online inspection of HEPA (High-Efficiency Particulate Air) filters was introduced; the company's ventilation system was trimmed; and a qualification programme was set up for the company's fume cupboards.

FORCE Technology continues to develop its validation and qualification concept to remain an attractive collaborative partner for the pharmaceuticals manufacturers, an industry, which must constantly live up to strict regulatory requirements. Our development plans also include working to combine FORCE Technology's expertise and key competencies in validation of all business procedures in all industries and in various markets – an offer that very few competitors would be able to match.





Collaboration through value sharing produces excellent results

New ways of working together with our customers is a crucial part of the market-oriented strategy that FORCE Technology launched a few years ago. The new forms of collaboration build upon a partnership between each customer and FORCE Technology. On a practical level, this means that we make individual and customized agreements with our customers in which we focus on the value that our partners and we can create.

We have now implemented this concept in all our business areas and are happy to say that these new forms of collaboration have proved their viability. The new concept has been well received by our customers as well, especially because we work together in a real partnership in which both parties share risk as well as gain. This is precisely what provides security and commitment, and ensures that both customers and FORCE Technology will endeavour to create as much value as possible, in the development and planning phase as well as in the services rendered.



Aarhus Olie A/S: Good experiences and results

Aarhus Olie A/S, a supplier of highly refined vegetable oils to the food industry, was one of the first of our partners in Denmark to experience first-hand the advantages of the new ways FORCE Technology has found to collaborate with its customers.



Since 2000, Aarhus Olie and FORCE Technology have implemented and completed a number of projects based on this new concept.

Most recently, Aarhus Olie needed a robust sensor that could gauge the precise amount of oil in their oil separators and thus ensure that Aarhus Olie did not discharge wastewater containing oil residue into the environment. The other solutions available on the market were not hardy enough to withstand the demanding environments found in the oil separators.

The new sensor also eliminates the risk of false alarms: Aarhus Olie only receives an alarm signal when the oil separators actually need to be emptied. This means that the company does not have to use unnecessary resources cleaning up oil and wastewater discharges.

Value creation for both parties

Our precise and stable sensor has provided Aarhus Olie with operational advantages and savings, and that is why Aarhus Olie and FORCE Technology continue to work together on a growing number of projects.





Automated inspection improves competitive ability of offshore industry supplier



Scana Steel Björneborg AB in Sweden, a company that supplies forged piping to the offshore industry, decided in 2002 to employ FORCE Technology's P-scan technology in its production control. P-scan replaced the company's manual production controls with an automated solution that would help Scana Steel Björneborg satisfy their customers' demand for a uniform and well-documented product quality.

Using P-scan technology, Scana Steel Björneborg now uses ultrasound to inspect all its pipe products instead of its previous method of manual inspection. The new technological solution eliminates the manual quality control that was based on subjective assessment, just as it eliminates the errors that this kind of control procedure can produce. The new P-scan inspection method supplies the full documentation of pipe quality that the company's customers want.

For this project, FORCE Technology developed a special version of its P-scan equipment specially designed to satisfy the needs of Scana Steel Björneborg. The principle of the system is that the machined pipe work piece rotates on a rack while five ultrasonic sensors probe the quality along the length of the pipe, from the inside out, and send the data collected to a designated PC. This allows Scana Steel Björneborg to evaluate the workpieces offline and gives them quick and easy access to the documentation whenever they want.

The shift from manual to automated inspection has already produced substantial improvements at Scana Steel Björneborg. Inspections that used to take 55 hours now take 11, and since the inspection process is automatic, it is also completely consistent. These factors have a direct positive effect on the quality of the inspection process and delivery times, and thus also on the competitive ability of the company. Automation of the process has also improved working conditions considerably: manual inspection involves making the same movements continually, which can be trying and, finally, harmful to employees.

The Scana Steel Björneborg project, with its customized P-scan solution, is a good example of FORCE Technology's strategy to use P-scan technology for production control in many specialized areas. Many other companies are opening their eyes to the potential offered by P-scan technology used in production control, e.g. Uddeholm Tooling and Avesta Polaroid, two companies that have already invested in P-scan systems.



Testing Tokyo Gas pipelines

Much of Japan's supply of energy to consumers and the private and public sector is based on natural gas distributed to customers through underground pipes or pipelines along the Japanese coast. With Japan in a geographic region that frequently experiences earthquakes, and since pipe installations can be damaged by undesignated corrosion, during excavation work or in other unforeseen circumstances, the authorities hold gas pipelines to the very highest standards with respect to materials quality and safety. Pressures in natural gas piping in the area are typically up to 80 bar, and even the slightest crack in a pipe can result in fire or an explosion.

For this reason, gas pipelines are tested thoroughly to ensure that they comply with safety requirements.

Tokyo Gas, one of the world's largest utility companies, supplies energy to the people of Tokyo. The extremely high population density in earthquake-prone Tokyo makes strict gas pipeline safety measures crucial, and Tokyo Gas asked FORCE Technology to test and inspect its gas pipelines.

FORCE Technology conducted six full-scale tests for Tokyo Gas in 2002. One test involved exploding 120-metre-long gas pipes and using highly advanced technology to gather vital data on what happened to the pipes during the course of the blast. A new feature of this test was causing the pipes to explode by pumping them with an overpressure of natural gas to reproduce realistic conditions as closely as possible and provide Tokyo Gas with valuable information, experience and results that could help increase supply security.





Other than FORCE Technology, there are only three other companies in the world – one in Italy, one in the UK and one in the USA – that can conduct this kind of explosion testing. Tokyo Gas chose FORCE Technology for the job because we possess the latest technology and have staff with the expertise – in fields such as welding and materials technology, testing techniques and data gathering and processing – necessary to handle the entire testing process.

New efficient energy systems

The demand for energy continues to rise. So far, energy production has been based on large combined heating and power stations. Over the past decade, however, smaller decentralized plants have become a viable supplement to traditional energy suppliers.

The market demands lower prices, better efficiency and longer lifetime, and those are some of the perceptible results produced by a new, future-oriented energy system developed by Rekuperator Svenska AB in a collaboration with FORCE Technology.

The new solution is based on microturbines, which are small flexible gas turbines that supply both electricity and heat. This is where the collaboration between Rekuperator Svenska AB and FORCE Technology was vitally important in the development of the new recuperator. A recuperator is a gas-based heat exchanger that uses the exhaust from a microturbine to heat the air before it reaches the combustion chamber.

Rekuperator Svenska AB has developed a new, groundbreaking design that increases the efficiency of the recuperator considerably: a design that includes a number of cells in a very thin sheet of material that is complex and very difficult and expensive to manufacture in a conventional manner. FORCE Technology became involved in the project in order to develop the most suitable assembly method and to ready the recuperator for production.

To obtain a stable process with minimal heat input and thus less deformation, FORCE Technology decided to use laser welding – one of our key competencies developed over many years of working together with clients in the aerospace and shipbuilding industries, among others. The laser process is extremely well suited for automated manufacturing because of its speed and stability and the high quality of the welds it produces.

In 2002, FORCE Technology built two prototypes of the new type of recuperator at its workshops in Brøndby (near Copenhagen), which were then tested under realistic conditions in a test setup at Volvo Gasturbiner in Sweden, with particularly positive results. The new recuperator design makes the unit an extremely competitive product with a high efficiency and long lifetime, and it is well suited for large-scale production.

Simulation technology to help Venice and its pilots

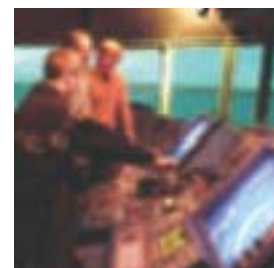
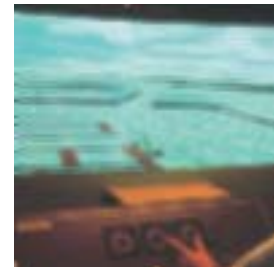
Italian meteorologists have found that the number of floods per year has risen, especially in the area around Venice, a city that lies in a low, relatively unprotected area. If the water level rises one metre above normal daily levels, the old canal city and all its historical buildings become flooded.

Ordinary dams have proved inadequate against the fierce forces of nature, so the Venice authorities are considering a plan to sink and secure a number of steel barriers in the ocean floor. When air is pumped into the barriers, they would move upwards and block the rising waters. However, there are risks when one tampers with nature: the barriers restrict ship access to Venice and boating within the city as well. In a worst-case scenario, this could keep ships from passing through the inlets to the Venetian lagoon under unfavourable weather conditions.

To limit damage in Venice and ensure the continued existence of the city, FORCE Technology's latest computerized simulation technology can help find out where and how the local authorities can protect the city and its assets in the most expedient way. Although the new technology was actually developed to safeguard international shipping, it has been a remarkably useful instrument in dealing with the highly unusual maritime conditions in the Venetian lagoon and the city's legendary system of canals.

New ways to limit damage

The Venetian lagoon project made highly unique demands on FORCE Technology, and it was necessary to think in terms of new and non-traditional solutions. Among other things, we developed a new simulation model that reproduces, with great accuracy, the depth of the lagoon inlets and the location of the city's jetties and coastal areas, along with ship traffic and routes through the very busy lagoon. With the new simulation tool, ship pilots in Venice will be able to get a good idea of how the navigational conditions may change in the future if the different methods to protect the city are implemented.





Unique in our field

The Venice simulation project had been up for tender, and FORCE Technology won the contract. FORCE Technology was awarded the contract because of our documented experience in simulation and maritime technology, especially our skills in developing highly realistic and exact computer models.

Although FORCE Technology has been working with simulation since 1976 and our experience database was extensive, we had to think in terms of completely new and non-traditional solutions. There have, however, been other benefits in the form of technological breakthroughs that will allow FORCE Technology to continue to offer ship owners and port authorities all over the world completely new ways to raise safety levels in internationally vital harbours. With what we have learned from this project, the international shipping industry will be able to use the latest simulation technology to save a great deal of time and money as well as boost safety and security in connection with ship access to and the design and dredging of harbours and other seaways.

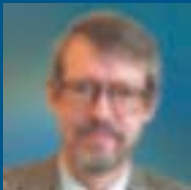


Board of Directors and Management

Management



Ernst Tiedemann
Managing Director



Willy Damgaard Kristensen
Technical Director

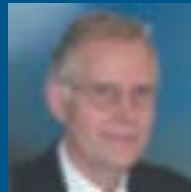


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Coordination Sweden-Denmark

Managerial Staff



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Director
FORCE-Dantest CERT



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Stig Sand
Head of Division
Maritime Industry



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Søren Jensen
Inspector
Employee Representative

Bugge Torben Jensen
M.Sc. (Mech. Eng.)
Employee Observer

Subsidiary

FORCE Technology Sweden AB



Hans Andersson
Managing Director

Number employed at year-end of 2002

Engineers, scientists, etc.	250
Other technical staff	431
Administrative staff	137
Total	818



Accounts





Profit and Loss Account

1 January - 31 December 2002

	Consolidated Account		Parent Company Account	
	2002	2001	2002	2001
	DKK 1,000	DKK m.	DKK 1,000	DKK m.
Consolidated turnover	574,413	491,4	478,256	408,7
Expenses directly related to projects, outlays	41,776	42,0	37,170	33,2
Other external expenses	124,111	105,5	96,819	89,4
Personnel expenses	360,815	296,0	305,644	245,4
Depreciations and write-downs	28,007	21,7	24,833	19,0
Share of profit	501	0,0	4,347	3,8
Profit before interests etc.	20,205	26,2	18,137	25,5
Financial income and expenses, net	-284	-0,3	-2	-0,1
Profit before tax	19,921	25,9	18,135	25,4
Tax	1,786	0,5	0,0	0,0
Profit for the year	18,135	25,4	18,135	25,4

Balance sheet as at 31 December 2002

Assets	Consolidated Account		Parent Company Account	
	2002	2001	2002	2001
	DKK 1,000	DKK m.	DKK 1,000	DKK m.
Fixed Assets				
Land and buildings	106,009	87,2	100,625	81,8
Furniture and equipment	56,976	46,3	45,417	36,8
Total tangible fixed assets	162,985	133,5	146,042	118,6
Participating interests	820	0,5	22,383	17,9
Financial fixed assets	820	0,5	22,383	17,9
Total fixed assets	163,805	134,0	168,425	136,5
Current assets				
Stocks	19,306	14,0	18,975	12,7
Debtors, work in progress and completed work	94,244	83,7	74,069	67,3
Intergroup balance	0	0	6,447	6,9
Other debtors	19,955	15,1	15,488	8,6
Debtors	114,199	98,8	96,004	82,8
Securities	40,591	33,9	40,591	33,9
Cash and bank balances	22,840	11,0	20,560	11,0
Total current assets	196,936	157,7	176,130	140,4
Total assets	360,741	291,7	344,555	276,9



Liabilities	Consolidated Account		Parent Company Account	
	2002	2001	2002	2001
	DKK 1,000	DKK m.	DKK 1,000	DKK m.
Capital and reserves	189,635	158,8	189,635	158,8
Deferred tax	1,775	0,5	0,0	0,0
Provisions	6,500	6,5	6,500	6,5
Total provisions	8,275	7,0	6,500	6,5
Mortgage dept	40,499	21,5	40,499	21,5
Total long-term debt	40,499	21,5	40,499	21,5
Mortgage debt	6,203	5,1	6,203	5,1
Bank loans	0	2,6	0	0,0
Creditors and accrued costs	22,667	21,2	18,283	18,4
Advance payments and invoicing	18,575	5,9	15,600	5,9
Other creditors	74,887	69,6	67,835	60,7
Total current liabilities	122,332	104,4	107,921	90,1
Total debt	162,831	125,9	148,420	111,6
Total liabilities	360,741	291,7	344,555	276,9



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