SSPA HIGHLIGHTS

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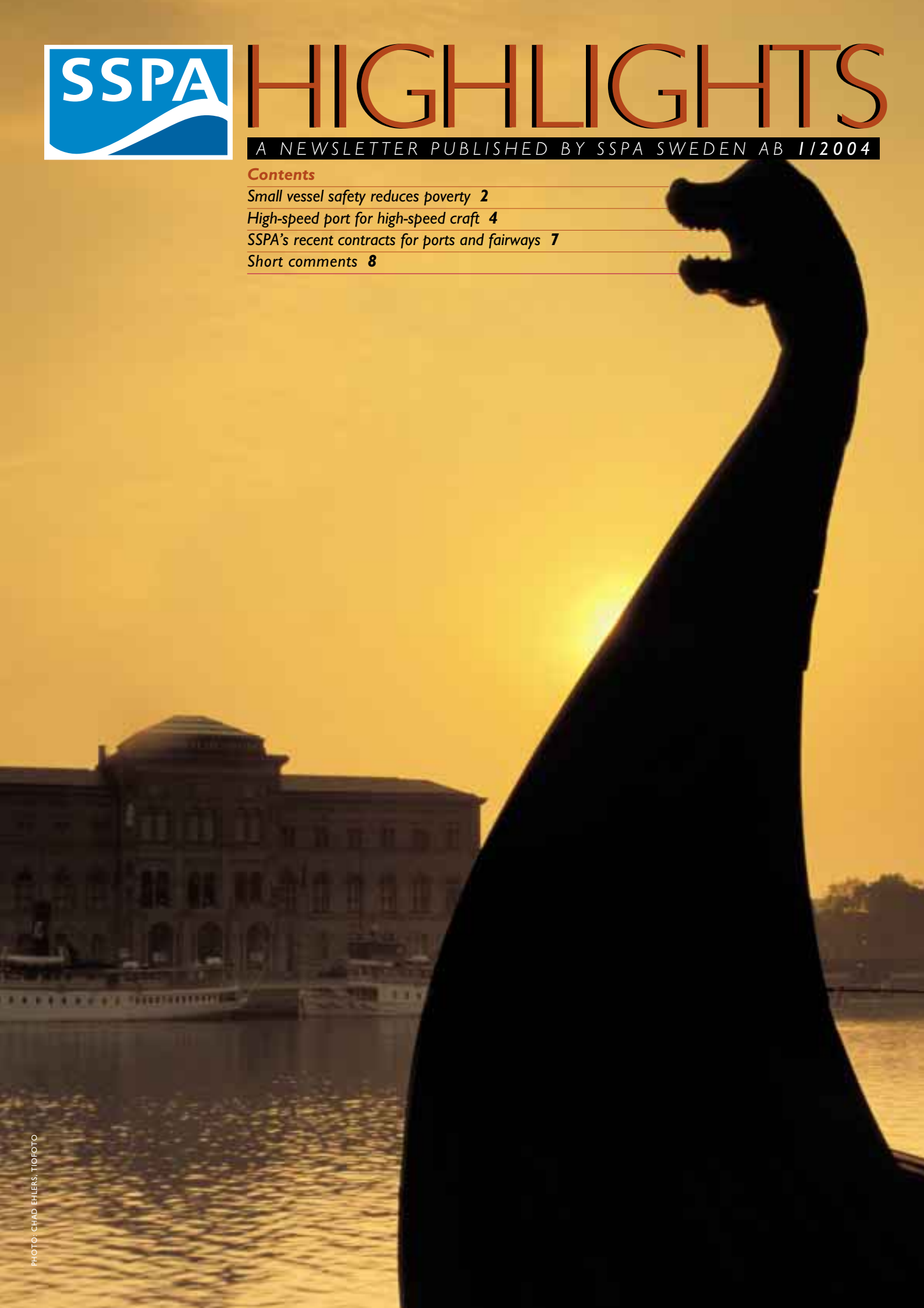

PHOTO: CHAD EHLERS, TIOFOTO

Shipping is now a booming industry. The volume of newbuilding contracts is higher than ever before. The driving factor is transport demand from Asia, particularly China. The state of the market in Europe and North America is still weak with high unemployment figures.

The population centre of gravity is in Asia, and this population is now moving fast. We all get lower prices on consumer goods as well as on ships, and we must face the fact that many products will be produced in Asia instead of in Europe. The situation is new, intensive and not necessarily bad – but calling for adaptation. We face a period of fast change!

From April 1 SSPA has been led by Susanne Abrahamsson. She has held many positions at SSPA over the last 15 years. We have been working together for the last four years, and it is now time to shift.

SSPA has the necessary competence and leadership to develop the business in a changing environment.

I will now get more time on my sailing boat and wish all clients and friends at SSPA good sailing in challenging waters.

Lars Afzelius

Small vessel safety reduces poverty

Fishing is the world's most dangerous occupation with more than 24 000 deaths per year. 640 accidents with vessels were reported in Oceania during the period 1989–90; 120 persons were lost at sea in the accidents. 570 fishermen and crew were lost at sea along with 110 vessels outside Andhra Pradesh on the east coast of India in 1996.

Small vessels used for fishing and transportation dominate the accident statistics. Small-scale fishing and human transport with vessels under 12 m frequently result in accidents with fatalities. These problems occur worldwide but are more frequent in developing countries. The huge amount of small, individually operated and locally built vessels, canoes and outriggers are not controlled by any international regulations like the IMO rules.

Education and economy control

Locally based fishing constitutes a considerable part of the local economy, and even affects the national economy in coastal countries. Most coastal people rely on the daily catches, made from small boats and canoes. The safety culture has to become a natural part of the occupation to be able to result in a decrease in the accident rate and to reduce the number of fatalities. Local fishermen and their families are very often not in the position to control or to invest in safety measures and improvements due to lack of economic resources.

Increased safety awareness together with local investment programmes and possibilities in coastal regions will reduce poverty in a long-term perspective. It is essential to emphasise the need for education and training to improve safety culture and reduce the number of accidents.

Several international reports highlight this issue. Training and education have been carried out in many countries with very good results, both in developed and developing countries. The education should take place at all levels in society. Children should be learning about the risks in school, women should obviously be trained as well as the fishermen and seamen. Boat builders should also be trained to avoid mistakes in construction and also in the reconstruction and up-grading of old vessels.

Authorities

One of the major problems is the lack of financial resources within authorities and organisations to make any improvement to the vessels.

Maritime and fishery authorities, meteorological institutes, coast guards, and other organisations are important stakeholders in the work to reduce accidents with small vessels. In most countries vessels less than 12 metres or even 24 metres are not registered in a national register for vessels, and the quality of the vessels could very often be poor.

Early warning systems are always important to prevent accidents from occurring, and such systems are in use in some countries. Weather forecasting is another important instrument to reduce accidents, but the problem is normally that the seafarer does not trust the forecast. Many families might not even have access to a radio. Another important issue is the coordination between different authorities, as well as between authorities at national and local levels.

Typical small outrigger, used in Tanzania, built according to local tradition and access to local material.
PHOTO: PER DANIELSSON

Traditional wooden boat construction, still used in more or less all the small vessels in Tanzania.
PHOTO: PER DANIELSSON

Stability and construction

Traditional constructions have very often been developed over a long period of time and have been well tested over time. Even in this very technical field it is more im-

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Jim Sandkvist, Lic. Eng., Vice President, SSPA Maritime Operations. He graduated from Lund University of Technology, Civil Engineering, in 1975 and was then employed as a research engineer, dealing with arctic engineering at Luleå University of Technology, where he also presented his thesis focusing on accelerated ice growth in ship channels. Since 1984 he has been employed at SSPA, working primarily in the marine environment field.
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portant to put the emphasis on training. The boat builder, the owner and the crew must be aware of the limits and the behaviour of the boat to improve the safety situation.

The design, size and form of small fishing boats are very often based on tradition and access to locally available material. The design is improved through interaction between the builder and the user, and is done on an empirical basis. The introduction of new material such as plywood or fibreglass presents opportunities for new designs and bigger boats. The mixture of old and new materials may, however, result in dangerous situations in accidents. A capsized traditionally built canoe or outrigger will float, even if it is filled with water, and the crew will stay on it. A more modern boat may sink if capsized.

Lack of safety equipment

Safety equipment is very often missing in small vessels due to lack of financial resources to buy the equipment. Basic safety equipment should be required for all vessels, the level of equipment will vary depending on the economic situation in the area as well as on the size of the vessel. To introduce compulsory life vests will probably be too expensive for some groups in developing countries, where other more cost effective solutions have to be introduced. One example is the wooden boat itself used as a life raft or as a life buoy if it is turned over and still floating.

SEAFDEC workshop in Bangkok – Recommendations

Recently Jim Sandkvist was commissioned by Swedmar and Sida to join the SEAFDEC Regional Workshop on Safety at Sea for Small Fishing Boats, to participate in discussions of the possibility to reduce accidents among small fishing boats. The major issues identified have been discussed above. In order to make it possible to carry out the recommendations it was considered important to promote technical and financial support for issues of safety including subsidies from authorities at all levels.

The basic requirements for safety should also be identified by means of research into the design and modification of traditional boats. Safety equipment, regular boat inspection systems, and appropriate communication systems should be developed. The meeting participants also agreed on the importance of developing appropriate incident reporting and investigation systems and training and education programs for all stakeholders including fishers and local boat builders.

The improvement of safety at sea for small fishing boats is not only a technical issue. The work is much more complex and should be seen as an important part of sustainable coastal zone development. SSPA, due to our extensive and broad experience from ship and boat design, hydrodynamics, maritime safety and coastal zone development in various parts of the world, is well prepared to deal with the important challenge to save lives at sea.

Per Danielsson / Jim Sandkvist

Traditional fishing vessel in Le Morne, Mauritius.
PHOTO: PER DANIELSSON

Activities with small vessels in Ha Long Bay, Vietnam.
PHOTO: JIM SANDKVIST

High-speed port for high-speed craft

Peter Grundevik, Project Manager, received his PhD in physics at the University of Göteborg/Chalmers University of Technology in 1982. He then worked at Ericsson Radio Systems developing e.g. laser radar, rangefinder and night vision equipment. In 1993 he became president of Dyning Utveckling, developing video conference and communication systems. He joined SSPA in 1997 and works with telematics and navigation technologies as well as co-ordination and project management of international projects.
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Linda Styhre is a Project Manager and PhD student at SSPA. She received her M. Sc. degree in Mechanical Engineering in 2001 at Chalmers University of Technology. In 2002 she joined SSPA and is working in the area of intermodal transport and port development using a logistic approach.
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High-speed craft operations have specific requirements regarding infrastructure, port design and port operating procedures. It is important that all activities are coordinated in order to achieve shorter total time in the transport chain for passengers and cargo, to avoid bottlenecks and to attain a smooth logistic flow. In some cases, dedicated facilities in port are necessary to reduce the turn around time and to improve efficiency. In other cases heavy investments in the port may not be of any benefit, because the high-speed craft (HSC) was selected for other reasons for which the time in port is not a critical factor. The transferability between different concepts and methods of enhancing flexibility in service operations of high-speed craft while retaining efficiency are important issues – SSPA has experience in a broad field covering ship operations, port layout and the transport process.

After three years of extensive work, the European research project TOHPIC (Tools to Optimise High-speed craft – Port Interface Concepts) has been finalised. TOHPIC was a research project partly funded by the European Commission (DG Research) under the GROWTH Programme of the 5th Framework Programme.

The main objectives of TOHPIC were to:
- optimise the interface between the quay and the HSC
- achieve faster turn-around times and shorter intermediate storage times
- reduce the risks of accidents during berthing/unberthing operations
- improve ship manoeuvrability in ports
- provide smooth logistics solutions for transferring passengers and goods, bunkering, catering etc. between the quay and the HSC.

The consortium consisted of 16 partners from 8 countries, representing all relevant types of organisations such as ports, shipping companies, equipment suppliers, maritime organisations, research companies and universities. SSPA was co-ordinating the project and has performed the ship model testing and manoeuvring simulation development as well as analysis of port interface and logistic flow. The work carried out by SSPA has also been partly funded by the Swedish Agency for Innovation Systems (VINNOVA).

What purpose for whom?

Results of the research are directed towards shipping companies that manage fast vessels and towards ports for HSC. Ship operators will be able to improve their operation on existing lines and analyse the conditions in a specific port before initiating new ones. Ports planning to start or improve existing HSC service will have tools for identification of possible solutions to eliminate bottlenecks and barriers to efficient operations in port. In this way, the port can enhance its overall economic competitiveness and this may drive the HSC operators to select the port as the terminal for their traffic. The TOHPIC results and tools will also be an instrument for design of new ports. Technical and scientific objectives to be achieved are focused on safety, effectiveness and low environmental impact of HSC operations in port areas.

The Stena Line terminal in Dun Laoghaire represents a specialised and very efficient HSC facility.
PHOTO BY COURTESY OF STENA LINE AB

In the Port of Nice, a simple quay construction without dedicated facilities provides high flexibility for the port, but increases the demands on the vessel.
PHOTO: PEDRO ANTÃO

Manoeuvring and mooring tests performed by SSPA for HSC have served as a basis for development of mathematical models of the ship dynamics.

The main objective of the project is to optimise the interface between high-speed craft and ports with respect to efficiency, safety and environmental effects.

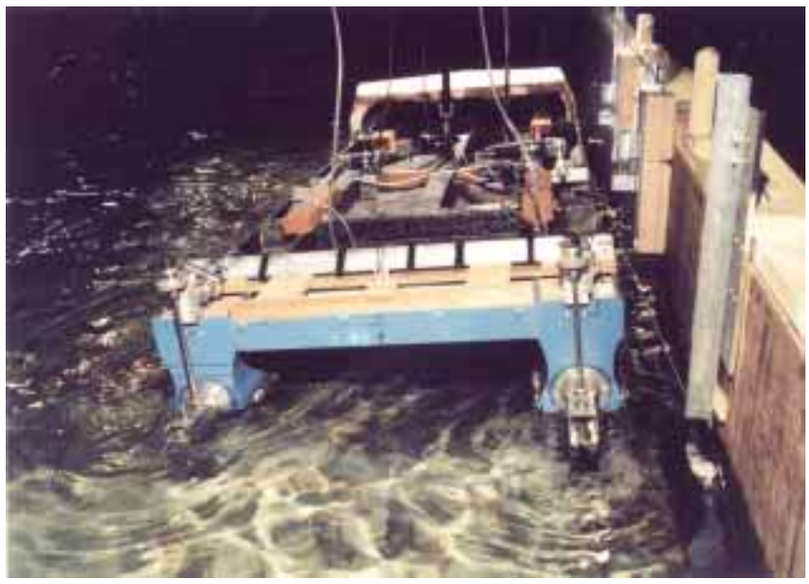


PHOTO BY COURTESY OF STENA LINE AB

A handbook for decision-makers in ports

SSPA has created a handbook directed towards decision makers and other interested parties in the port, to be used as a manual when new fast shipping initiatives or further developments are considered. In the developmental stage, there are many factors to be taken into account to ensure commercial success. Most services fail because of inappropriate vessel selection, too high initial investment costs and overconfidence concerning the market that might be attracted. In order to plan and implement HSC service in a new area it is also necessary to carefully assess the risks this may impose on the surrounding activities and the environment. Contrary to most waterborne transport, HSC often include transport of passengers rather than goods. The most important reason is that the fuel consumption for high-speed craft is very sensitive to total weight, and this results in a high price level for transport of cargo.

The functionality and efficiency of the HSC operation is clearly dependent on a number of critical parameters. The handbook contains the following sections: market needs and business opportunities, localisation aspects, requirements for the HSC, port layout, the logistic flow in port, ship operations in harbour, risk and environmental impact assessments. The handbook is available from SSPA.

Three case studies

Verification of the results of the TOHPIC project has been performed by analysing three case studies where some completely different examples have been selected. The ports chosen for the case studies are:

- Port of Dun Laoghaire, to verify the operational conditions of one of the few specialised HSC terminals in Europe
- Port of Nice, which has strictly and precisely regulated the approach/departing operations of HSC
- Port of Barcelona, whose expansion trend foresees the construction of a dedicated HSC terminal.

Regulations for HSC navigation

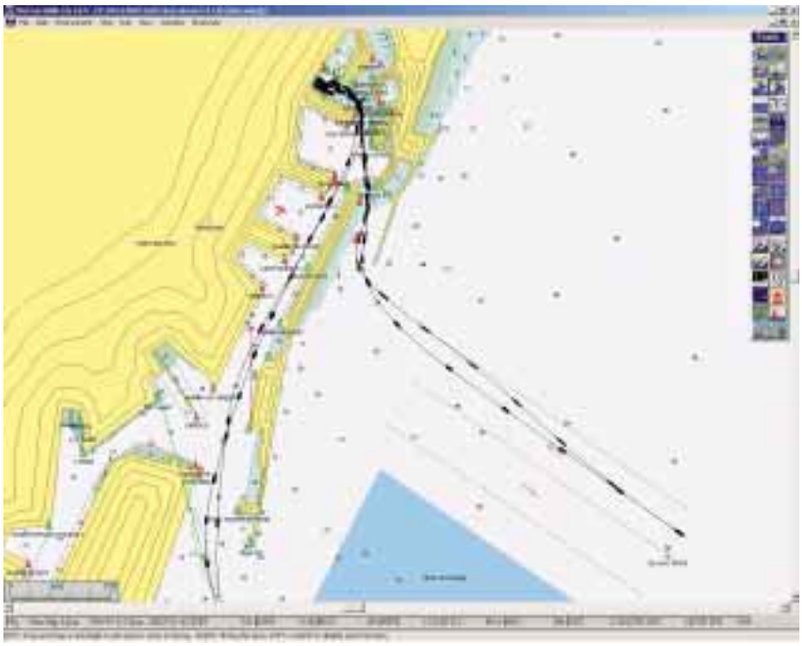
Existing regulations and procedures for HSC navigation near coastal and port areas have also been in focus for

The simulation tool for port layout modification and training allows the user to visualise the port environment.
PHOTO: FRÉDÉRIC CAPOULADE

the project. Optimised rules and practice have been defined and the following amendments to the IMO Conventions are proposed:

- Requirement for specific signalling for high-speed vessels (an HSC is to be defined as a craft capable of operational speed in excess of 35 knots, which is different from the definition of a high-speed craft in SOLAS Chapter X) (COLREG 23)
- Obligation to have a dedicated radar look-out by an officer on board the high-speed craft, who does not assume any other task on the bridge (COLREG 5)
- Requirements for Automatic Identification System information to be displayed on the radar screen, the carriage of ECDIS to be made mandatory and the turning rate of the radar antenna to be adapted to the speed of the ship (HSC Code).

Safety and time aspects of the new port entrance, dedicated to passenger vessels in Barcelona, were examined by simulations.



Partners in TOHPIC:

SSPA (Co-ordinator)	IST
AMRIE	MacGREGOR
CETEMAR	METTLE
D'Appolonia	Port of Barcelona
Dublin Port	SINDEL
French Riviera Port Authority	SNCM
Glasgow University	Stena Line
IFN	Trasmediterranea

The TOHPIC consortium members are putting forward these proposals to the Maritime Safety Committee of IMO for adoption.

HSC in shallow waters

Detailed manoeuvring characteristics for HSC in shallow waters have not been well known. Since this is important when docking, it was found to be an essential area to investigate. Manoeuvring tests were therefore performed by SSPA in deep and shallow water for a fast catamaran and for a fast mono hull, as well as mooring tests in irregular waves for the vessels lying along a quay. The tests have served as a basis for the development of two advanced mathematical models of ship dynamics. The models developed have been significantly improved in three main areas:

- Shallow water influence on manoeuvring characteristics
- Shallow water influence on resistance characteristics
- Interaction effects between ship and quay.

Simulator tool for design, Cost/Benefit analysis and safety

The mathematical models developed were implemented in a software simulator tool for ship manoeuvring, where different interfaces and port layouts were implemented. This is the main exploitable outcome of the TOHPIC project and the tool creates a visual and simulated scenario from the proposed improvements and design ideas. Four databases with the ports involved in the case studies have been created to visualize real conditions. Special attention was given to the Port of Barcelona, where the new entrance dedicated to passenger ships was examined.

The results of the simulator tests carried out in the project have allowed cost and benefit analysis and have provided the data necessary to make validations and possible optimisation of the operations.

Another important possible use of the tool is for port authorities to evaluate the level of safety in the port waters, especially in congested mooring place conditions and pre-evaluation of possible port layout modifications.

Peter Grundevik / Linda Styhre

SSPA's recent contracts for ports and fairways

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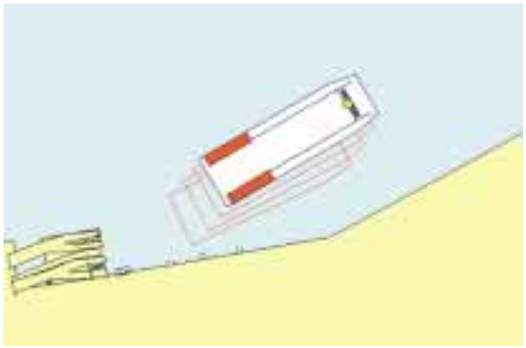

Safe and timesaving mooring of High Speed Craft in different weather situations is an important part of the logistic chain. SSPA has over the years carried out a lot of such simulations for clients world-wide.

The new expanded fairways into the Port of Göteborg are now nearly finished. The blasting and dredging is close to completion, and the fairway beacons are ready for installation. SSPA's part of this project was a comprehensive risk analysis including manoeuvring simulations.
PHOTO BY COURTESY OF THE PORT OF GÖTEBORG

M-real – Husum Industrial port located in the Baltic Sea (Örnsköldsvik). SSPA has carried out a variety of consultant work for Husum industrial port. The first part was a logistic study focusing on the flow of paper pulp and paper products from the factory to the storehouse and the quays. For handling increasing production and improving the safety in the port, a new port design was created including a new breakwater and extension of the quays. SSPA is also involved in the Environmental Impact Assessment (EIA).
PHOTO: LINDA STYHRE

Port of Göteborg – Skarvik oil terminal. There are several tank farms in Skarvik Harbour which are used for intermediate storage of petroleum products. To increase the business opportunities for the farms the port authority plans to increase the maximum tanker draft to 13 metres. For this project SSPA has investigated the dredging requirements and tug assistance for safe mooring.
PHOTO BY COURTESY OF THE PORT OF GÖTEBORG

SSPA has been commissioned to carry out the EIA and risk analysis work required as a result of the Maritime Administration's and the Port Authorities' safety and environment improvement of the main fairways through the Stockholm archipelago to the city.
PHOTO: JIM SANDKVIST

Short comments

New research in safety

At the end of 2003, two national research projects were initiated in respect to the VINNOVA (the Swedish Agency for Innovation Systems) call 'MARITIME SAFETY 2003-2005 – a new step towards a zero vision:

DESSO – Design for survival onboard

The term 'a ship which is its own lifeboat' was used in the VINNOVA call. The objective is to develop a conceptual ship design that will allow the ship to stay afloat long enough, in the case of an accident, to allow all passengers to be rescued with traditional external means. The project will focus on a ropax design.

In the consortium of nine companies/institutions much of the extensive experience in Sweden in this field is found, and experts from Europe will be used as subcontractors. SSPA is acting as project leader.

The project is mainly financed by VINNOVA. The total budget for the project is about 1.2 million Euro.

REBUS – Development of new rescue-boat system

The goal of this project is to improve the possibility of saving lives by using rescue-boats during ship accidents, and also to improve the working environment by minimizing risks with the rescue-boat handling procedures. A prototype of a new, improved system will be designed and manufactured, and full-scale demonstrations will be performed. The project is aimed at developing equipment that makes it possible to launch and re-haul a rescue-boat on a passenger ferry in significant wave heights of 3 m or more.

SSPA is the coordinator of the project, and the project team includes experts from the Technical University of Chalmers, shipyards, ship owners, suppliers, design and consultancy companies. The Swedish Agency for Innovation Systems (VINNOVA) and Swedish Maritime Administration (Sjöfartsverket) are supporting the project with 1.2 million EUR and the partners' contributions are 0.7 million EUR.

Björn Allenström / Claes Källström

Traffic Ship Model Keeper

SSPA has developed a new Traffic Ship Model Keeper (TSMK) ordered by Poseidon AS, to be used in their radar and ship-handling simulators for training purposes. The TSMK is able to simulate hundreds of dynamic ship models simultaneously.

For a number of years SSPA has sold an advanced model keeper – Own Ship Model Keeper (OSMK), based on SSPA's general manoeuvring and seakeeping program (Portsim). However, OSMK uses a lot of computer resources, because it needs to apply complex calculations to a very large amount of data.

We have tried to make TSMK as simple as possible – but the hydrodynamics and dynamics of each individual ship are still well described, following the laws of physics. 'Traffic ships' are 'simplified' own ships that are controlled either by thrust and rudder angle, or by an autopilot, to set speed and course. They can either be connected to a pre-defined traffic route, which they will automatically follow, or be free sailing. 'Traffic ships' can be invoked or disabled at any time during the simulation process. Environmental parameters affecting the traffic ships, such as wind and current, can either be route specific or specified for each individual ship.

The TSMK is delivered as a stand-alone component (a so-called DLL). The TSMK must thus be loaded and driven by a host program. The DLL is a so-called .NET component which means that it can be used from the latest version of Microsoft's development environment – Visual Studio, using program languages such as C# or VB.NET. It is also possible to use the DLL by classic COM interoperability, using for example FORTRAN, C++ or "VB classic".

Lars Johansson

New president of SSPA

On 1st of April 2004 Lars Afzelius stepped down as President of SSPA and was succeeded by Susanne Abrahamsson. She has been working at SSPA in various positions for many years, so for many of our readers she is already well known. Susanne Abrahamsson was employed at SSPA in 1988, after graduation as a Naval Architect at the Royal Institute of Technology, Stockholm, and has for a number of years been working with seakeeping and manoeuvring of high-speed ships. During 1997–1998 she was Head of Marine Laboratories, and since 1999 she has been Vice President, SSPA Ship Design.

New sports boat

SSPA Sweden AB has been involved in the manufacturing of a canting keel for a new sports boat, the Backman21.

The design of the Backman21 was inspired by the mini transat boats, and she is built with the latest high-tech material, such as epoxy, carbon and kevlar.

The plugs were made on an EPS core covered with a PUR-modelling paste, which was milled and sanded to the final surface. The moulds were then made with epoxy vacuum bag technique.

Krister Snyder

Milling of a plug for the B31 canting keel with the CAD model visible.

Please visit our website! www.sspa.se

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