Shipbuilding in China

Toward New Shores

SUBMARINES In the Wake of Jules Verne
DAMAGE STABILITY Hull Strengthening Pays Off
STUDY European Map of Wind Energy
INNOVATION IS HARD WORK. For almost two whole years, a team of engineers from Germanischer Lloyd worked intensively together with shipbuilding experts from Hyundai Heavy Industries on the design and construction plans for a new generation of very large container ships. The technological challenges were enormous, the calculations time-consuming and the result – a ready-to-build design for a 13,000 TEU carrier – nothing short of impressive. This German-Korean development project demonstrates clearly what we understand by the promotion of technical progress in shipbuilding: recognizing a possible requirement ahead of time and then helping to forge the technological trends at an early stage, so as to give our shipowner clients yet another product innovation in container shipbuilding. And surely that’s exactly what is needed.

Technical competence is also called for when international regulations on damage stability are tightened, hence restricting, for example, the cargo loading flexibility for mid-size ships. Thanks to an innovative assessment procedure, we can take account of collision strength and still meet the new safety requirements, be quick in calculating and evaluating ship structural drawings and, despite rising newbuilding prices, generate tangible benefits for our customers. The cost accounting in ship operation is influenced by the quality of shipbuilding, by the maintenance of the ships and machinery and by the service routes.

In the shipbuilding sector, the People’s Republic of China has set itself ambitious targets. It aims to move up to the top slot in only a few years. The efforts being taken by the yards, and Germanischer Lloyd’s approach to ensuring that the construction rules are met despite the dynamic pace of development, are described from various angles in several articles in this issue. In view of the continuous rise in prices for fossil fuels, alternatives are urgently needed. In an interview with “nonstop” the leading expert for wind energy at Stanford University in America paints an optimistic picture of the opportunities offered by renewable sources of energy. What do you think?

Yours sincerely,

Rainer Schöndube
Member of the Executive Board
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News from Maritime Services

Hyundai Heavy Industries: Order Your Mega Carrier Now

Whoever is taken by the sophisticated design of the new 13,440 TEU container ship by Hyundai Heavy Industries and places an order will have to be patient. The Korean yard will only be able to deliver the first of what will then be the biggest container carrier ever built in 2009. Indeed, the product of Korean-German cooperation tops all of today’s limits: with a length of 382 m, a beam of 54.2 m and a deadweight tonnage of 153,000 t, this mega container ship can carry up to 13,440 boxes with an average weight of 11.4 t, of which 6,230 containers will be stacked below deck in 10 layers in 19 rows and 7,210 on deck in 21 rows. The innovations in this “ship of superlatives” are easy to find. Driven by two 45,000 kW engines, the new leviathan of the seas attains a speed of 23.5 knots. The twin drive offers a number of advantages over a single-screw design with negligibly higher capital expenditure. Besides the safer ship operation, the size of the engines and propellers as well as their better maintenance and procurement of spare parts means that the operating costs are also optimized. The SOLAS requirements regarding bridge visibility led to the logical decision to separate the deckhouse and engine room. The position of the deckhouse in the forward part of the ship permits even greater container capacity and smaller ballast water tanks. The imminent international regulations on the protection of fuel tanks are also satisfied with this design, because they are located in the protected area below the deckhouse. Another welcome result of this innovation is reduced bending and increased stiffness of the hull.

For further information: Jan-Olaf Probst, Head of the “Hull” Competence Centre and Ship Type Manager for Container Ships, Phone +49 40 36149-327, jan-olaf.probst@gl-group.com

I.M. SKAUGEN

Innovative Tanker on Order

Skagen has ordered three tankers for liquefied petroleum gas (LPG) and chemicals from a Chinese yard, and Germanischer Lloyd has been entrusted with their classification. In worldwide gas transport, the I.M. Skagen Group is one of the major players. In September, the contract was signed in Singapore by Mortiz Skaguen jnr, Chief Executive Officer, and Hergen Thielemann, Division Manager East Asia of Germanischer Lloyd. With the expansion of its fleet, I.M. Skagen is reacting to the growing demand for liquefied gases, including ethylene, and chemicals in the import and export trade with China. The new tankers will be given four stainless steel pressure tanks offering 5,800 m³ for liquefied gas or chemicals, together with seven coated tanks of 3,900 m³ for organic chemicals. The total capacity will thus be 9,700 m³.

The ships have a maximum draught of eight metres and a deadweight tonnage of 10,200.

Germanischer Lloyd.
Singapore: Maritime Asia Awards Get-together

Over 400 top shipping executives from the region got together on 29 September 2005 in Singapore to honour the best of the Asian maritime industry. Germanischer Lloyd acted as a primary sponsor of the 2005 Maritime Asia Awards for the seventh time in a row. The winners in 15 categories were selected by Maritime Asia readers together with the panel of independent naval experts. The event’s main prize – Hall of Fame – went this year to Sumate Thieu of the World-Wide Heavy Industries, the world’s largest shipyard. Further winners included PACIFIC International Lines (Intra-Asia Operator), Singapore Maritime Academy (Youth Development), Keppel Shipyard (Ship Repair Yard), World-Wide Shipping (Tanker Operator), Pacific Basin Shipping (Bulker Operator) and Anglo-Eastern Ship Management (Ship Manager). For the third time, the Young Development), Keppel Shipyard (Ship Repair Yard), World-Wide Shipping (Tanker Operator), Pacific Basin Shipping (Bulker Operator) and Anglo-Eastern Ship Management (Ship Manager). For the third time, the

THE LANDRINI PRIZE GOES TO ... OULD EL MOTAR

Dr. Ould El Moctar, Deputy Head of the Department for Hydromechanics, received the Landrini prize for ship hydrodynamics at this year’s Numerical Towing Tank Symposium in Bulgaria in October. The jury of international experts selected him for his recent work in developing and applying numerical techniques in the field of computational fluid dynamics for the marine industry. Born in Mauritania, he studied naval architecture in Hamburg and completed his doctorate on the “Numerical Computation of Forces Acting on Maneuvering Ships”. Dr. El Moctar started his career at the Hamburg Ship Model Basin (HSVA), and has been working in the hydromechanics department of Germanischer Lloyd since 2002. The prize is named after the top scientist in ship hydrodynamics, Maurizio Landrini, who died in June 2003. Dr. El Moctar is the second laureate after Prof. Hu from Japan who received the award in 2004. For further information: Dr. Ould El Moctar, Deputy Head of the Department for Hydromechanics, Phone +49 40 36149-182, oud.el.moctar@g-l-group.com

GERMANY

Shipbuilding Association

The German Shipbuilding and Ocean Industries Association (VSM) is one of the leading mouthpieces for Germany’s maritime industry. As the political and economic representation of the yards that build ocean-going ships and inland waterway vessels as well as of the marine supply industry, the association actively advocates the business interests of its 110 members towards political institutions and the public sphere. In addition, the VSM promotes the technical and economic development of shipbuilding and offshore technology, both at home and abroad. Dr Hermann J. Klein, Member of the Executive Board of Germanischer Lloyd, has now been appointed to the VSM Board.

ANGELO-JAULI-

MARITIME SERVICES - NEWS

HEAD OFFICE NEWS

New Office Building in Hamburg

At the beginning of September, Germanischer Lloyd inaugurated a new office building on “Johannisbollwerk” near the Landungsbrücken quay in Hamburg. Following conversions and finishing work on a large scale, the building was officially opened by Hamburg’s Senator for Economy and Labour, Gunnar Uddal, together with Rainer Schindube, Member of the Executive Board. About 200 of the 1,250 Hamburg employees are now based within the 6,560 sq m afforded by this block.
The Rostock software house MS Logistik Systeme has a new stockholder. The purchase of a 75 per cent interest in the firm by Germanischer Lloyd was concluded in November. Program development at the software company is focused on high-performance ship management suites, for example SAMS (Ship Administration Management System), from which 200 seagoing ships are already benefiting worldwide. A new development in this regard is the SAMS Port Clearance Module. SAMS Port are already benefiting worldwide. A new management suites, for example SAMS focused on high-performance ship.

The Mexican Navy is expanding its fleet and relies on the classification services of Germanischer Lloyd. A contract was signed for the classification of patrol boats with the Hamburg-based society. The ships are designed by the Swedish shipyard Dockstavarvet. Starting with three patrol boats classed according to the new naval rules of Germanischer Lloyd, the series is expected to consist of up to 40 vessels. The sail training ship “Cuauhtemoc”, training future officers of the “Armada de Mexico”, is already sailing with GL class.

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**Rottterdam**

**Certificate for Radio and Navigation Systems**

In October, the Radio Holland Group received certificates as an approved service supplier for the inspection and testing of radio and navigation systems and voyage data recorders (VDRs) from Harald Seibicke, Area Manager Benelux/North-West Europe at Germanischer Lloyd. Thanks to the worldwide quality management system implemented by the company, this certificate is valid for all subsidiaries. According to IACS Unified Requirement Z17 and IACS Recommendation 89, the flag state examination of navigation and radio equipment including VDRs must be accompanied by the special expertise of classification societies within the scope of safety equipment surveys and safety radio surveys. Established in 1916, the Radio Holland Group is active with various subsidiaries worldwide in the manufacture, inspection and servicing of radio and navigational systems, and has been a partner of Germanischer Lloyd for over 30 years. For further information: Harald Seibicke, Area Manager Benelux/North-West Europe, Phone +31 10 2040404, harald.seibicke@gl-group.com; www.radiohollandgroup.com

**Canadian Committee**

**Shipyard Tour in the Canadian Province of Quebec**

The 11th Meeting of the Canadian Committee took place in September, 700 km north-east of Montreal on the Gaspé peninsula. The committee is comprised of Rear Admiral Denis Verreault – CEO and President of the Groupe Maritime Verreault Inc. shipyard and Chairman of this GL committee – and her husband, Captain Richard Beaupré, President of Verreault Navigation, had invited the committee to Les Méchins. Jens Schreiter, Ship Type Manager for Passenger Ships, and Hugues Mazhari, Area Manager Canada, presented Shipboard Routing Assistance (SRA), a navigational aid to increase ship safety, and the Environmental Passport to the committee members as a special guest, Christian Nath, Managing Director of Germanischer Lloyd WindEnergie GmbH (GL Wind), informed the participants about the wide-ranging field of activities for the GL subsidiary, the topical background to this being the major investment in wind energy planned by the Canadian government. Moreover, GL Wind had been accepted as a member of the Canadian Standards Association (CSA). After having been brought up to date on the current developments at Germanischer Lloyd, the committee benefited from various outlook meetings. Furthermore, they visited the “Institut maritime du Québec”, at which young Canadian seafarers are trained. Since 2004, a cooperation agreement has existed between the institute and GL Canada; under its auspices, a bulk carrier forum was held at the end of November in Montreal with Sonke Pohl, Ship Type Manager for Bulk Carriers and Multi-Purpose Ships.

**Exchange of News and Views**

**Navy and Shipbuilders in Dialogue**

How can the construction of vessels for the German Navy be optimized further? Where are potentials for cost-cutting to be found, and how can both the schedule and the budget be met? These and other questions were the focus of attention during an intensive exchange of news and views between more than 50 naval architects, representatives of the German Navy and officials from the Federal Office of Defence Technology and Procurement (BWB) which took place in the middle of September at Germanischer Lloyd in Hamburg. The participants were united in striving for a continuous dialogue to improve the level of cooperation in the application and advancement of science and regulations. Speakers from the Navy and the Naval Arsenal outlined the experience to be gained in the operation of combat support ships built according to classification rules from the civilian sector. Further events of this kind are planned. For further information: Lorenz Petersen, Head of the Naval Projects Department, Phone +49 40 36149-254, lorenz.petersen@gl-group.com

**Trade Fairs**

**JANUARY**

31 January – 3 February, 2006, Sydney, Australia

Pacific 2006, International Maritime Conference

www.pacific2006.com

**FEBRUARY**


VoithShip

www.voithship.com.vn

**MARCH**

30 March – 2 April, 2006, Istanbul, Turkey

ExpoShipping

www.sif-exposhipping.com

13 – 16 March, 2006, Miami Beach, USA

Marine Cruise Shipping

www.cruiseshipping.net

22 – 24 March, 2006, Singapore

Asia Pacific Maritime

www.apmarine.com

29 – 31 March, 2006, Singapore

InterTanko

www.intertanko.com

**NAVY**

“Armada de México” Orders Patrol Boats with GL Class

The Mexican Navy is expanding its fleet and relies on the classification services of Germanischer Lloyd. A contract was signed for the classification of patrol boats with the Hamburg-based society. The ships are designed by the Swedish shipyard Dockstavarvet. Starting with three patrol boats classed according to the new naval rules of Germanischer Lloyd, the series is expected to consist of up to 40 vessels. The sail training ship “Cuauhtemoc”, training future officers of the “Armada de México”, is already sailing with GL class.
The Wide and Wonderful World of Marine Engineering

The profession of ship engineering is characterized by attractive variety and impressive complexity. The book “Dampfer, Diesel und Turbinen” provides an insight into the various fields and tasks of marine engineering. Besides some historical background, the current training opportunities and educational facilities are described and supplemented with selected pictures. The experienced engineers who collaborated on this work include Gerhard Fischer, who worked for Germanischer Lloyd for over ten years (most recently as general advisor representative), as well as Norbert Erles, currently Head of Damage and Repair. A book for anyone who would like to learn more about the technical aspects of the ocean giants, this is also an indispensable aid for building marine engineers. Vbias Bütz, Karl-Heinz Hochhaus, Harrie Pietsch, Jürgen Taggesell et al. (Editors), “Dampfer, Diesel und Turbinen. Die Welt der Schiffsingenieure.” Published by the German Maritime Research Institute.

RECOMMENDED READING

The Development of Ship Propulsion

Ships have been serving us for thousands of years as a method of mass transportation. While they only used to cover short distances at first, larger distances soon became commonplace. In his book “Schiffsantriebe – 5000 Jahre Innovation”, Hans-Jürgen Warnecke covers the entire chronicle of development, from the dawn of history to the present day. Historical data and technological processes are presented here together with technical improvements and innovations. An interesting read, not only for ship aficionados and maritime “insiders”. Born in 1934, the author worked in industry for many years before entering the world of teaching as a professor at Stuttgart University. From 1993 to 2002, he was President of the Fraunhofer-Gesellschaft in Munich, Hans-Jürgen Warnecke: “Schiffsantriebe – 5000 Jahre Innovation”, Publisher: Koehlers Verlagsgesellschaft mbH, 5000 Jahr e Innovation, ISBN 3-7822-0908-7 (FMEA/RCA).
LIKE WORKERS IN A BEEHIVE, the shipyard personnel are busy welding, sawing and hammering. But these “busy bees” wear overalls, helmets and safety shoes. Rows and rows of prefabricated sections lie waiting to be used. A product tanker waits in the dry dock for launching, while container ships float at the pier. And above them all, gigantic blue cranes, strong enough to lift 580 tonnes in one go, preside majestically over the action.

This is how you might imagine one of those perfect Korean shipyards. But wait: the workers here are not standing to attention, nor are they limbering up with early-morning exercises. We are in China – to be more precise, at the Dalian New Shipyard, one of the most modern in the country.

Established in 2000, the yard churns out a million dwt per year. And its efficiency is increasing steadily: three years ago, the yard needed 15 months from steel cutting to delivery of the finished ship, and today it is only 10. On average, it is able to hand over one ship to the customer every month.

STILL A LONG WAY TO GO

But not all yards in the Middle Kingdom have been operating this professionally for any length of time. Some are still hindering themselves with old management methods, while others lack new equipment and machines. Slipways have not yet been replaced by the more efficient dry docks. Frequently, there are not enough electricians, welders and fitters with adequate training. The consequences are then low productivity and poor quality.

Sinophobic observers hope that the “lack of quality awareness” will bring an end to this unsettling Far Eastern boom. Their speculation is that, when the general upturn in the shipping world slackens off, the Chinese yards will be dropped from the order lists, sooner or later, for precisely this reason. But the yard managers are already aware of this issue. “The trend is crystal clear,” says Hergen Thielemann, Director of the Division East Asia at Germanischer Lloyd. “The Chinese yards are catching up fast, especially as far as quality is concerned.

Dalian New Shipyard is one of the most modern in China. Vice-President Zhang Tao (left) and Tian Tao, Station Manager of Germanischer Lloyd Dalian
In China, Ger-

To a large degree, the industry is remote-

Hergen Thielemann, Division Manager East Asia

begin at Hudong-Zhonghua Shipyard in Shanghai. Recently,

they have achieved a breakthrough in the tonnage, design

tankers, modern RoRo ships, VLCCs, VLOCs ... and now

taking on challenges of quite another dimension: LNG

bulk carriers during the eighties and nineties, they are now

Estimates indicate that the next record will be set in 2005,

dwt in 2004 – achieving a world market share of 14 per cent.

Chinese government has

building nation by

Until this goal is

the Chinese yards

be exhorited to pro-

duce a total of 24 million

dwt per year. This may be

an enormous quantity, but it

is not just wishful thinking.

Even though the output was

just 6 million dwt in 2002, the

Chinese were already

able to record 8.5 million

dwt in 2004 – achieving a world market share of 14 per cent.

States indicate that the next record will be set in 2005,

10 million dwt and a market share of 17 per cent.

Although Chinese yards mainly built simple feeders and

and bulk carriers during the eighties and nineties, they are now

taking on challenges of quite another dimension: LNG

tankers, modern RoRo ships, VLCCs, VLOCs ... and now

they have achieved a breakthrough in the tonnage, design

and construction of high-tech ships. In 2005, fabrication of the

first container ships with more than 8,000 TEU will

begin at Hudong-Zhonghua Shipyard in Shanghai. Recently,

Dalian New Shipyard built 100,000 dwt VLCCs and

Wágaoqiao Shipyard completed bulk carriers boasting

175,000 dwt.

STATE INFLUENCE

To a large degree, the industry is remote-

controlled from Beijing. However, “state-governed” does

not mean that the yards can still operate like state-owned

enterprises. They have to be efficient and make a profit.

Recently, a yard on the Lower Yangtze River was allowed to

fold. There will be no more endless infusions of cash when

they do not have the desired effect. A market-directed econ-

omy is the order of the day: in 1999, Beijing prescribed com-

petition for its government yards – no longer only against

Korea and Japan, but also amongst each other. Until this

point, most of the state-owned yards had been small cogs in

a huge machine. The umbrella organization has been split

up: the CSIC (China Shipbuilding Industry Corporation)

controls the shipyards along the coast north of Shanghai,

while the CSSC (China State Shipbuilding Corporation)

directs the yards from Shanghai down into the Pearl River

Delta. In 2004, CSSC and CSIC together were responsible

for around 66 per cent of the country’s entire ship produc-

CSS and CSIC organize framework programmes on a

gargantuan scale, because capacities cannot be maximized

solely through more efficient workers and improved man-

agement methods. Above all, the yards need room for

growth. At all the yards in the triangle between Dalian in the

north, Guangzhou in the south and Wuhan in central China,

everyone is talking about moving. The first thought that may
go through your head on hearing this is “megalomania hits

China”.

But no, it is simply that the yards have no more space for

the necessary extensions at their current locations; the ship

sizes are limited by external factors, such as low bridges and

shallow water. On closer consideration, megaprojects like

the relocation of entire shipyards to islands or river banks

not restricted by bridges seem entirely feasible and down-

right sensible. Generous loans are being provided. “China’s

shipbuilding policy is well thought-out, meaningful and

planned with a view to future needs,” is the praise from

Hergen Thielemann. “They are not just hastily patching

things together for the next few years.”

A LAND OF OPPORTUNITY FOR THE CLASS

In China, Ger-

manischer Lloyd classifies all types of vessels, including

multi-purpose ships up to 33,000 dwt, bulk carriers up to

Panamax size, chemical tankers up to 37,100 dwt, and oil

tankers ranging up to VLCCs. The focus lies on container

ships, however. The largest container carrier with GL class-

built to date in China was the “MSC Queensland” with

5,480 TEU. The leap into the next league has already been

taken. Germanischer Lloyd has received the order for the

8,310 TEU ships being built for the Chinese shipping com-

pany China Shipping at the Hudong-Zhonghua yard. These

vessels will sail under the dual class of both Germanischer

Lloyd and the China Classification Society. With this pro-

ect, Germanischer Lloyd is participating in the largest con-

tainer ships ever to be launched in China. And, with China

Shipping, the society has won over a major Chinese partner.

With the many newbuildings, the operating area of “mat-

erial and component inspections” is also growing for

Germanischer Lloyd. Fewer and fewer parts are being

imported for the ocean behemoths. Local factories manufac-

ture the switchboards, hatch covers and generators, and cast

the rudder horns, stern frames, anchors, propellers and con-

tainer components. Engines by Wärtsilä and MAN B&W

are being produced under licence in China.

And even the area of “fleet service” is growing at a fast

pace. This is not only due to the increase in world tonnage –

The yards and suppliers in China are spread out over the entire country.

Above: Completed hulls at the Wágaoqiao Shipyard in Shanghai. Right:

Workers at the Wenchong yard in Guangzhou. Below: Yi Chong Xi in

Deputy Director of Dangshan Shipping in Wuhan. Next for ships, con-

sisting mainly of feeders, multi-purpose ships and chemical tankers, are

usually delivered every year.
The greatest challenge for Germanischer Lloyd lies in the huge expanse of the country. By comparison, Korea is only a little spot on the map, the major yards are big in size but small in number. The surveyors work at a total of nine yards which all lie relatively close to each other. Things are quite different in China, where the engineers from Germanischer Lloyd work at a total of 32 newbuilding yards, with this number growing steadily. The newbuilding yards lie in three main regions: in the area around the Bo Hai Sea in the north-east, in Shanghai and along the banks of the Yangtze, and in the Pearl River Delta to the south. Attendance to the fleet in service is limited to almost "only" the coastal region, especially the ports of Dalian and Shanghai. The factories of the marine suppliers are scattered over all the provinces, even deep into the hinterland. The offices of Germanischer Lloyd go where the customers are found: Shanghai, Jiangyin, Nanjing, Wuhan, Guangzhou and Dalian.

CITY OF SUPERLATIVES The highest buildings, the best cuisine, the most elegant women, the biggest harbour. So it is only fitting that Germanischer Lloyd also has its largest Chinese office here. In total, 31 men and women work for the maritime section of Germanischer Lloyd in Shanghai. In the office complex on Huaihai Road, one of the city's main shopping streets, you will find more than the 22 staff members of Station Shanghai. A separate office called Approval Services East Asia (ASEA) takes care of design and plan approval. Furthermore, there is the Country Office China with Thomas Marken as Manager and the Area Office China, which also controls the offices in Hong Kong and Taiwan. And, of course, this is also the home of the Division Office East Asia.

Here, on the twelfth floor – with a fine view of construction pits, skyscrapers and the last little hudongs – is where mission control for China is to be found. And yet "the surveyors in our office do the same work as their colleagues at all the other stations," says Shen Xiao Dong, Manager of Station Shanghai. "They look after newbuildings, inspections of materials and components, and also attend to the fleet in service. For these tasks, they mainly work at the yards and in the production halls in Shanghai. However, sometimes their duties take them out to the surrounding provinces."

TWO OFFICES IN JIANGSU Near Shanghai, there are two Germanischer Lloyd stations in Jiangsu province: Jiangyin and Nanjing. This is because the shipping industry on the Yangtze River is developing in a particularly dynamic manner. The Yangtze is the lifeblood of China. For many kilometres, the broad and muddy river with the yellow-brown hue winds its way from west to east right through the country. Ships crawl busily along the river, bow and stern touching. As far back as Chinese chronicles go, there have always been boats on this mighty river. And they have always been put together on its sandy banks. Today, there are about 100 shipyards in Jiangsu province alone, just upstream of the estuary to the East China Sea. Many are in private hands, and almost all are keen to grab a share of the export business. "We receive a lot of enquiries," says Lu Guowen, Station Manager in Jiangyin. "We advise and support the yards to help them achieve the necessary quality and meet the requirements. Very often, they already have a great deal of experience."

The yards on the Yangtze mainly produce smaller vessels, such as feeders and bulk carriers – not because they are unable to build larger ships, but because low bridges and insufficient draught present a hindrance. The last adjustments, like setting the propeller, are frequently undertaken when the ship reaches Shanghai. And, of course, the sea trial is carried out at sea, since water depths of 30 to 40 metres are not to be had anywhere on the river. Jiangsu province is important for the shipbuilding supply industry too. "Practically everything you need to build a ship is produced here. Only the really big engines still come from Shanghai or Korea," says Lu Guowen.

Although the 17 staff members in Jiangyin are only responsible for an area covering 150 square kilometres, there are 200 suppliers manufacturing products that all have to be inspected. For the same reasons, the surveyors in nearby Nanjing are also unable to complain about a lack of work. When
Waldemar Krampff came to Nanjing in 2000 as Station Manager for Germanischer Lloyd, he asked himself: “What am I doing here?” At the time, he only had a single new-building to process. “And then, suddenly, came the boom,” he recalls. Today, the 11 surveyors have to shoulder a full workload. Apart from the inspections at suppliers, the surveyors also spend their time at the newbuilding yards. “Especially at the Jinling Shipyard in Nanjing, it’s like working on a highway production line,” says Krampff. The yard belongs to the China Changjiang National Shipping Corporation (CSC), a state shipping company operating on the Yangtze (in Chinese, the river is called Changjiang), which also owns other yards, transport firms and tourism companies. “At the moment, there are four ships nestling next to each other – and three more jostling in the water.”

There is always work to be done. Because most yards in China only have a limited quality management system of their own, the surveyors have to check everything thoroughly during construction.

**FAR AWAY IN THE HINTERLAND** Wuhan is the third station on the Yangtze River. With a population of 8 million – really a minor city from the Chinese viewpoint – Wuhan lies 1,400 kilometres up the river, which means that it no longer has reason enough for Germanischer Lloyd to move to this yard.” Everyone is expecting a stable exchange rate. “What will happen once the exchange rate of the Chinese renminbi is no longer pegged?” asks Yang Sheng Mou, deputy chief engineer at Jinling Shipyard in Nanjing. The low non-wage labour costs in China would certainly prove attractive for the shipowners. What he says does not only apply to his yard. “But we are careful about committing ourselves to long-term contracts,” he points out. In recent years, the yards have experienced, all too painfully, how fluctuating steel prices and a weak dollar were able to reduce or even dissolve their profits. In this respect, the question that is uppermost in the managers’ minds is: what will happen once the exchange rate of the Chinese renminbi is no longer pegged? “Perhaps the renminbi will be allowed to float completely. And then, we really don’t know what will happen then.” Everyone is expecting a stable development – not least because of the trends in domestic demand. At present, the Chinese economy is absorbing more than a fifth of the container tonnage, and the situation is similar for bulk goods. And one has to remember that about two

**THE PEARL RIVER DELTA** Since 2002, Germanischer Lloyd has been working from a base in Guangzhou, the capital of the southern Chinese province of Guangdong. Guangdong is of particular importance to shipping – and not only because of its 3,186 kilometres of coastline. The Pearl River, China’s third longest river, runs right through the province before it enters the South China Sea. In its delta, a metropolitan area has developed in which huge cities like Guangzhou, Shenzhen and Zhuhai melt into each other almost seamlessly – with the special administrative regions of Hong Kong and Macau joining from the south.

The favourable strategic location was not the only reason to send twelve surveyors to the “deep south”. One of the largest newbuilding clients of Germanischer Lloyd, the Wenchong Shipyard, is also situated there. The yard has been building ships to GL class since 1996. In total, it has delivered 26 ships for German owners, with 22 more under construction or contracted for the coming year. “Wenchong specializes in 1,700 TEU container ships, eight can be delivered every year,” says Johannes Jongebloed, Station Manager in Guangzhou. “Four of our surveyors are constantly on duty at this yard.”

There are other newbuilding yards requiring the surveyors’ attention in the neighbouring province of Fujian. Fujian, which is export-oriented by tradition (having become famous over the centuries for its silk merchants and business-like pirates), lies only 100 kilometres away from Taiwan. There are no less than six deep-water ports along its 3,324-kilometre coastline.

**ALL NEW ON THE NORTHERN FRONT** Dalian lies at the southernmost tip of the Liaodong Peninsula in the north-east of China. The coastal city is one of the most pleasant spots in China and a popular retreat in summer, when the rest of the country swelters in the heat. The constant breeze from the open sea blows away the smog that has become an unwelcome “permanent visitor” in other cities. But fresh air was not reason enough for Germanischer Lloyd to move to Dalian in 1998. Nor was it because of any newbuildings. The favourable strategic location was not the only reason to send twelve surveyors to the “deep south”. One of the largest newbuilding clients of Germanischer Lloyd, the Wenchong Shipyard, is also situated there. The yard has been building ships to GL class since 1996. In total, it has delivered 26 ships for German owners, with 22 more under construction or contracted for the coming year. “Wenchong specializes in 1,700 TEU container ships, eight can be delivered every year,” says Johannes Jongebloed, Station Manager in Guangzhou. “Four of our surveyors are constantly on duty at this yard.”

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**WHAT’S NEXT?** The order books of the yards are full right up to 2008. “We could be taking orders for the time after that,” says Yang Sheng Mou, deputy chief engineer at Jinling Shipyard in Nanjing. The low non-wage labour costs in China would certainly prove attractive for the shipowners. What he says does not only apply to his yard. “But we are careful about committing ourselves to long-term contracts,” he points out. In recent years, the yards have experienced, all too painfully, how fluctuating steel prices and a weak dollar were able to reduce or even dissolve their profits. In this respect, the question that is uppermost in the managers’ minds is: what will happen once the exchange rate of the Chinese renminbi is no longer pegged? “Perhaps the renminbi will be allowed to float completely. And then, we really don’t know what will happen then.” Everyone is expecting a stable development – not least because of the trends in domestic demand. At present, the Chinese economy is absorbing more than a fifth of the container tonnage, and the situation is similar for bulk goods. And one has to remember that about two

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GERMANISCHER LLOYD IN CHINA

Germanischer Lloyd had its own offices in China since 1994. By constantly expanding its presence, GL now has eight stations: in Shanghai, Dalian, Tsingtao, Hong Kong, Jiangsu, Ningbo, Wuhan and also in Kaohsiung (Taiwan). Shanghai is the location for the Country Office and the Area Office China, the Approval Service East Asia and the Division Office East Asia. In total, Germanischer Lloyd employs a workforce of over 150 in the region. The main activities focus on newbuildings, the inspection of materials and components, and attendance to the fleet in service. For the classification of newbuildings alone, Germanischer Lloyd booked an order volume of almost 300 ships, with 8,530 TEU units being built for China Shipping at the Dudgeon-Zhenghai yard.

In addition, numerous multi-purpose vessels, bulk carriers, and chemical and oil tankers are listed in the order books of Germanischer Lloyd in China. Added to this are the extensive material and component inspections for the expanding supply industry. What is more, the growing volume of global tonnage and the increasing trend to employ the latest technology in newbuildings will continue to increase the demand for our services around the world. GL has therefore decided to expand its presence in the region, opening a new office in Shanghai.

LOYALTY AND EXPERIENCE

In 1405, Emperor Yong Le had just ousted his nephew from the throne. The order for his fleet was simple: "Proclaim my glory." At the same time, new trade routes were to be opened up. The Emperor placed the fleet under the command of Zheng He, a eunuch. He is said to have looked like an incarnation of Ti, the god of war and wealth: over two metres tall, with a high brow and wild staring eyes. Born in 1371 as a Muslim in the south-western part of China, he began his eunuch "career" as a child at the court of Prince Zhu Di – the later Emperor Yong Le. Although he had fought in many wars for the prince, he had never stood on the bridge of a ship until 1403. For the Emperor, Zheng He's unswerving loyalty was the prime factor in choosing him to be admiral of the fleet. The fact that he was no seafarer was of little importance, because there were experienced captains to navigate the ships. With great skill, they exploited the monsoon winds and

planned their course with the aid of nautical almanacs and detailed seacharts. The course was kept by means of magnetic compasses, which had already been used in China since the 11th century. Indeed, the people living along the Chinese coast were able to look back on a proud tradition of ocean trade spanning a thousand years.

THE FISHERMEN WERE PARALYZED WITH FEAR. At first they heard only the distant rumbling of drums. And then they saw the junks with darkred sails, blindingly white hulls and terrible eyes at their bows. In the middle was the mighty fleet of over 300 ships, a whole army of men were to be seen – numbering 28,000 in total. The soldiers amongst them wore tiger masks and bamboo mail. The fleet had come from the yards around Nanjing and was on its way into the South China Sea. Never before, and never again, would wooden ships of such a size sail across the oceans. The cara-

vans with which Christopher Columbus set out in 1492 could have fitted into one of the treasure ships six times over.

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ONLY AS FAR AS AFRICA – THEN THE EMPEROR DIED Zheng He undertook a total of seven expeditions, always navigating along similar routes: down past the coasts of Vietnam and Thailand, Sumatra and Java through the Straits of Malacca to Bengal, Sri Lanka and India. From the fourth voyage on, he ventured even further, to the Arabian Peninsula and down the east coast of Africa. And everywhere he went, he took aboard trade commodities and novelties: spices, medicines, fine cloth, spectacles … and a giraffe. The Chinese thought that the giraffe was a qilin, a mythical horned creature that only appeared when an emperor of impeccable virtue occupied the throne. Unfortunately, the power of this perfect emperor did not last for ever. His death in 1424 heralded the decline of China's enterprising high-sea fleet. China returned to the strict Confucian tradition, which forbade both foreign trade and relations with other countries. The Confucian officials were of the opinion that agriculture was the only source of wealth and that China was all that the Chinese needed. The construc-

tion of seagoing ships was stopped and, in 1525, the port authorities were instructed to destroy all ocean vessels – a sad end to what had been a glorious fleet.
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AMONGST THE TOP THREE “By 2010, we want to be first or second in the world ranking in January 2005, with a capacity of 191,833 TEU. In May, it had already moved up to 10th place with 290,000 TEU. With the stowage place capacities, CSCL has now drawn even with China’s shipping giant, COSCO.

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IN DIALOGUE: CHINA SHIPPING GROUP

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Containerships will be launched here soon: The construction site of the new Jiangnan yard on Changxing Island

**Toward New Shores**

Shanghai’s yards need to grow and the newbuilding volume must increase. Lots of space is needed for this. But downtown on the river – where the yards are currently building – there is just no room left. The solution is to use islands in the Yangtze.

The speedboat slaloms over the Yangtze – past all the tugs, rusty bulk carriers, decrepit ferries and modern feeders. It takes half an hour to get from the wharf in Pudong, Shanghai’s modern business district, to the island of Changxing in the Yangtze estuary. Thirty minutes that keep worlds apart. In Pudong, the men wear suits and ties, the women are dressed in skirt suits and nylon tights. On Changxing, however, the farmers’ shirts are bleached from the sun and their shoes are full of holes. Until now, this river island with its orange trees and many birds had been left to slumber peacefully, but now everyone is curious about this sandy patch hardly eighty square kilometres in size. Changxing is destined to become China’s largest shipbuilding base. Eight kilometres along the south bank of the island have been reserved for yards.

The word Shanghai literally means “on the sea”, but little of the ocean can be seen from the city itself. The city is built around the river, the Huangpu. The major shipyards are clustered about its banks, occupying land which is highly valuable in this city with a population of 14 million. Not only the people are living in confined conditions – even the yards have no space at all for expansion. And yet, the plan says that the manufacturing capacity of the Shanghai yards – currently 3 million dwt per year – is to be boosted to a total of 12 million dwt by 2015. For this reason, the yards have to make space and also have to be given space.

### First Relocation to Changxing

On the banks of the island, houseboats bob on the waves, their rusty superstructures patched with plastic sheeting. But only a few metres away, red and yellow pennants block off the way to a muddy area, the exact size of which is obscured by the haze. This is where, in a construction period of only two and a half years, the new Jiangnan yard will be built. It will be the first yard to move from the banks of the Huangpu River to Changxing Island. Construction officially started on 1 June 2005, the 140th birthday of Jiangnan Shipyard.

The yard was founded under the Qing Dynasty and was China’s first production facility for naval vessels, steel and steel cannons. Today, its workforce builds Panamax bulk carriers and chemical tankers, LPG tankers, open-top container ships, and floating petroleum storage units (FPSUs). Chen Jin Hai wears a blue overall and the Chinese flag on his lapel. Up until his retirement, he was director of the Jiangnan Shipyard, now he is the president of the strategy and steering committee of the yard. Although he belongs to the old school, today, its track record is very good. Chen Jin Hai is pleased and proud that his yard was the first to obtain a construction site on Changxing, all the more so because Jiangnan is currently located on the site intended for the World Expo 2010. This was a stroke of luck in itself. “We would have had to move anyway. Our possibilities in the city are exhausted: we cannot expand and we cannot build ships that are any larger,” says Chen Jin Hai. Ships leaving the dock may not exceed 80,000 dwt, otherwise they are likely to get stuck under one of the two bridges or run aground on the river bed. “At the new yard, we’ll be able to build larger and more modern ships at long last.”

During the first phase of construction, which is due for completion at the end of 2007, four dry docks are to be built. The largest will be 520 metres long and 76 metres wide, and even the smallest will measure 165 metres in length and 82 metres in width. LPG tankers, LNG tankers, super tankers, luxury liners and container ships with up to 10,000 TEU will then be launched. The first deliveries are scheduled for 2009. With this move, the yard will expand its capacity from almost a million dwt per year to 4.5 million dwt. The cost is expected to exceed ten billion renminbi.

### Islands Not Only for Shipyards

Shanghai Zhenhua Port Machinery (ZPMC), one of the largest manufacturers of container bridges, is already producing on Changxing. An out-of-the-way island in the muddy Yangtze might not seem the ideal place for industrial companies, not even if ships are being built there. For this reason, the island is being connected to the trans-
China Catches up with Tank Containers

Chinese manufacturers have virtually monopolized the industry and are now adding new production capacity. They are also making an entry into the field of tank container construction.

EVEN THOUGH the percentage of general cargo that is now containerized stands at over 75 per cent, the growth in the production of containers shows no sign of abating. In fact, it is now at a record level. China dominates dry box manufacturing, accounting for 95 per cent of the total output. In 2004, global dry freight container production reached approximately 15 million, some 2.6 million twenty-foot equivalent units (TEUs) compared to 1.2 million in 2001. The two leading Chinese manufacturers are responsible for 80 per cent of global production. The various factories of China International Marine Containers (CIMC) turned out 1.52 million TEU in 2004 while those of Singamas produced 0.78 million TEU. The drive for growth has become more intense than ever. If all current expansion plans come to fruition, Chinese dry freight container manufacturers will boost their production capacity by a further 1 million TEU over the coming year, pushing the total output capabilities of builders worldwide up towards the 5 million TEU mark by mid-2006. Such a capacity is prodigious, considering that the total fleet of standard dry freight containers currently in circulation worldwide is approx. 15 million.

The most specialized type of container is the tank container, a pressure vessel positioned within the container frame. Although the global fleet, at about 200,000 units, is relatively small compared to the number of dry boxes in circulation, tank containers have been around for almost as long as containerization. The first units were built in the late 1960s to enable the intermodal transport of fluids like beer and chemicals in Europe. Today, the majority of tank containers are 20-foot, cylindrical units made of stainless steel and able to carry up to 26,000 litres. However, there is also a significant fleet of so-called swap tanks built especially for transport in Europe over long distances. Designed to match the cargo-carrying capacities of traditional road tank trailers, swap tanks are in excess of 20 feet in length and can be transferred easily between a rail wagon and a road chassis as part of the overall intermodal journey. The additional length of swap tanks is provided by either extending the dished ends of the tank out beyond the 20-foot container frame or positioning the tank within a 40-foot frame. Unless they are dedicated to the transport of food-grade products, tank containers are built to the UN portable tank standards governing the carriage of dangerous goods (see info box) This provides the tank with a high degree of flexibility in terms of the full range of chemical and other cargoes it can carry. A tank built according to UN requirements is able to move freely and without hindrance on journeys worldwide involving more than one mode of transport.

TANK PRODUCTION Initially, all tank containers were built in Europe. Although a number of US manufacturers dabbled under licence to designs originally developed in Europe, CICM and ZZTC are manufacturing tank containers under licence to designs CIMC produced 4,000 tanks in 2004 and expects to manufacture 6,000 units in 2005. New production capacity has been added to its Nantong plant to provide the company with the capacity to produce 10,000 tank containers a year. In contrast to CIMC’s potential volume, the total tank container production worldwide in 2004 was only 13,000 units. China obviously has ambitions to emulate its achievements in the dry freight sector in tank container manufacture.
Containers are generally certified according to the provisions of the International Convention for Safe Containers of 1972 (CSC). The strength of the frame, walls, floor and roof as well as the container’s weatherproofing, stackability and lifting characteristics are tested. Permission to manufacture containers of a new type is only granted when type testing has been completed successfully.

THE CERTIFICATION of tank containers is also subject to strict statutory conditions which can vary greatly, depending on the country. Tanks for tank containers are designed on the basis of recognized codes for pressure vessels, such as those of ASME (American Society of Mechanical Engineers) or the AD regulations in Germany. Additional tests become necessary because of national and international regulations on the conveyance of dangerous goods if, for example, toxic liquids or gases are to be transported. The type testing of tank containers is conducted in test centres which have been certified by a classification society and possess an approval for the conveyance of dangerous goods if, for example, toxic liquids or gases are to be transported. The type testing of tank containers may necessitate a dynamic impact test. For this, the container may be subjected to a force corresponding to four times the maximum allowable gross weight of the container. Following the approval process, tank containers must, at regular intervals, be subjected to pressure tests, internal and external inspections as well as other tests, depending on the applicable laws.

THE TOKYO MEMORANDUM of Understanding (MOU) is part of a network of agreements on port state control that now spans the most important sea regions around the globe. The party states include Australia, China, Indonesia, Japan, Canada, Korea, Malaysia, New Zealand, the Philippines, Russia, Singapore, Thailand and Vietnam. It was modelled on the Paris Memorandum of Understanding of 1982, in which the European port states agreed to monitor compliance with the regulations on ship safety, marine environmental protection and shipboard working conditions. Whereas 21 per cent of all foreign-flagged ships have been examined thus far in the ports, the aim in the future will be to concentrate on vessels representing a particular safety risk.

The Tokyo Memorandum covers a region of tempestuous economic growth and correspondingly dense shipping traffic. In 2004, 10,922 ships sailing under 93 different flags were inspected in accordance with the Tokyo MOU. Of these, no less than 1,393 ships were detained because of serious deficiencies. These primarily involved the life-saving appliances and fire protection arrangements, despite the fact that the party states had put the main focus of the 2004 inspections on precautions against terrorist attacks, on the basis of the IPS Code. This year, the focus will be on fire protection, life-saving appliances, emergency plans, GMDSS, navigational equipment, and the prevention of marine pollution. The signatory states of the Paris and the Black Sea MOUs will be concentrating on similar issues.

THE INTERNATIONAL CONTINUING CRUISE VESSEL REGULATIONS for cruise vessels in international ports (ICCR) came into force in 1988. The ICCR are complementary to the Paris MOU. They contain specific inspection requirements for cruise vessels. Since the introduction of ICCR in 1988, it has been possible to examine all cruise vessels in international ports. The exchange of information on deficiencies detected in cruise vessels is an essential part of the implementation of ICCR. It enables deficiencies found on one port to be taken into account by other ports.

Port state control was originally envisaged as a third line of defence against sub-standard vessels. In the first place, the shipowners and ship operators are responsible for ensuring compliance with the international regulations. Monitoring of compliance is then a matter for the flag states of these ships. This arrangement is still provided for by the Law of the Sea Convention of 1982. It was only after a series of spectacular marine accidents with catastrophic consequences for the marine environment that the coastal and port states were forced to realize that relying on the flag states did not always work. This gap was then closed by port state control (PSC).
TIME IS RUNNING out fast for owners and operators of small dry cargo tonnage. Damage stability requirements as mapped out in Chapter II, Rule 25-1 of the SOLAS convention were extended to ships with a length of over 80 metres in 1998. “Hence, many more designs of feeder and multipurpose ships will have to comply with these specific rules than in the past,” explains Hendrik Bruhns, Head of the Stability Department at Germanischer Lloyd. “Due to the huge backlog of vessels on order, which is still being worked off, the new requirements are only starting to kick in. “The main challenge for the industry is to maintain operational flexibility for vessels built from now on,” says Mr Bruhns.

Most designs for small dry cargo ships were based on one large cargo hold, which provided operators with maximum stowing flexibility. Different container sizes and breakbulk cargoes could be stowed unhampered by divisions within the hold. Such an open-plan layout will be hard to achieve in the future. In order to comply with the damage stability requirements of SOLAS, conventional vessels will have to be fitted with transverse bulkheads. These will increase their survivability in the case of water ingress but at the same time reduce their loading flexibility. However, Germanischer Lloyd has developed an approval procedure which will enable owners to stick to more flexible, open-plan arrangements for double-hulled dry cargo ships without compromising damage stability. The society has enhanced its damage stability calculation possibilities by including colliding resistance in the formula. “It is the first time that the strength of vessels has been considered when assessing damage stability,” says Dr Leshan Zhang of the Strength Department at Germanischer Lloyd.

THE VULNERABILITY FACTOR Damage Stability assessment is based on the assumption that the inner hull of every ship is equally likely to be penetrated regardless of its strength. Therefore, vessel designers had to take steps to make sure vessels would survive damage which could lead to flooding, irrespective of the energy absorption capabilities of the double hull. The society has now turned this rather simplistic procedure into a more realistic one by putting more emphasis on ship’s vulnerability. “Vessels with strengthened structures and thus higher collision resistance are simply less prone to leaks or breaches of the inner hull. Therefore, the overall chances of survival can be equal to or even higher than those of conventional ships outfitted with a higher number of bulkheads,” says Dr Zhang.

The SOLAS convention permits such alternative formulas for damage stability calculation for dry cargo ships provided that an equal level of safety can be guaranteed. Germany has already notified the IMO that it will accept the new Germanischer Lloyd approval procedure, and other flag states are expected to follow suit. “I am sure that today a lot of flag states would already support this alternative approval procedure on a case-by-case basis,” reckons Dr Bruhns.

Small dry cargo vessels are bound to become more cramped and less flexible when the current SOLAS damage stability rules are applied. New R&D technologies pioneered by Germanischer Lloyd, however, will enable shipowners, shipyards and design offices to retain the more economical, optimized designs without compromising safety.

Increased collision resistance will help owners of small dry cargo vessels to comply with SOLAS damage stability requirements. They will thus be able to benefit from traditional, very economical single cargo hold arrangements.
THE UNDERWATER WORLD is mysterious, dangerous and quite murky. Water absorbs the light so strongly that up to 90 per cent of the daylight is filtered away only twelve metres below the surface. So it is not possible to see very far; even a well-equipped submersible can illuminate at most ten metres of the Baltic Sea when all the external spotlights are switched on. No wonder that the search vessels took five years to find the wreck of the “Titanic”. And it lay only 16 miles away from the point at which the last known coordinates indicated that it should have been found. The world under the waves is so enigmatic because more people have been in outer space than over 5,000 m below sea level. One of the reasons for this is that there are only a few submersibles worldwide that can dive down to such hull-crushing depths. The most famous of these are called MIR 1 and MIR 2, are absolutely identical and belong to the P.P. Shirshov Institute of Oceanology in Moscow. The “boats” have been in service without interruption since 1987. With their aid, the Russian researchers have discovered so-called hydrothermal systems at the bottom of the oceans: where hot fumes and toxic vapours escape from hundreds of small openings, a rich ecosystem thrives in the middle of what is otherwise a cold and barren wasteland.

WANTED FOR CHARTER
To help finance the costly research activities of the institute, the boats are often chartered out – to well-heeled adventurers, treasurehunters and Hollywood stars. Once they were even hired by a group of American investors to find two ships which had been lost during the Second World War off the west coast of Africa with cargoes of gold valued at 83 million dollars. Even “Titanic” director James Cameron developed a taste for underwater excitement. He and the Discovery Channel used the MIR boats to film the interior of the “Titanic”. This was a challenge, not only of the cinematographic kind, because the MIR ventured into rooms lying 3,800 metres deep that had not been seen since 1912. Viktor Nischtscheta is the pilot of MIR 1. With a degree in literature and electronics from Moscow University, he is as well versed in vodka as he is in computers. But, most of all, Viktor values the unique feeling of doing his job in a confined chamber more than 5,000 metres deep and in the icy cold – the steel wall of the submersible makes sure that the interior is at the outside temperature of two to four degrees Celsius. The heart of the MIR is a pressure-proof sphere with a diameter of 2.20 metres, in which Viktor and his companions have to sit, huddled closely together. The vessel is approved for three people, who can get a view of the outside by lying down and looking through three small viewpoints of acrylic glass – also known by the tradename plexiglas – with a thickness of 180 millimetres. Viktor is a man who knows no fear. When he dives at depths of 5,000 or 6,000 metres, his heart never misses a beat – a comforting thought for those inside. Harald Pauli, Head of the Department for Pressure Vessels and Underwater Technology at Germanischer Lloyd, has known the pilots Eugeny Chernaiev and Viktor for over ten years now. They met when the Russian institute approached Germanischer Lloyd with a view to having the two craft certified. Since then, relations have been deepened, thanks also to Viktor’s and Eugeny’s superior, Dr Anatoly Sagalevitch, who is the driving force behind the country’s ambitious underwater research programme.

CHECK-UP AT GERMANISCHER LLOYD
Last autumn, Harald Pauli met Dr Sagalevitch again in Russia to perform a renewed test dive with both boats. “Every ten years,” says Pauli, “the boats are stripped down. They are taken apart completely, so that each detail can be checked.” This intensive overhaul takes about nine months, culminating in the trials of the sphere in the pressure chamber at the Krylov Institute in St Petersburg, arguably the only test facility of its kind worldwide. As an internationally
After a successful pressure test, Pauli took the vessel for a test dive in the Baltic: “I was quite confident that things would work out,” the engineer explained, who manoeuvred the two boats down to 120 metres together with Eugeny and Dr Anatoly Sagalevitch. “The Baltic doesn’t get any deeper.” Amongst the features tested were the dynamic manoeuvrability under water, whether the boat could dive and surface again properly, whether it could freely descend and ascend in sedimentary sand, whether the side thrusters functioned for individual navigation, correct operation of the electronics and hydraulics – and of course whether the boat was watertight. “For this aspect, an underpressure tightness test was performed on the deck of the mother ship, the Russian research vessel ‘Akademik Mikhail Keldysh’ by way of preparation,” says Pauli and explains how he once unceremoniously operated the “panic switch”. This emergency switch cuts off all the electricity to the craft; it is used in the event of cable fire, for example. An independent emergency lighting system is then activated, and voice communications also remain functional. But Viktor doesn’t bat an eyelid at testing tricks like that. He just takes things as they come and thinks of his next trip down to 5,000 metres. Harald Pauli’s department is also responsible for all pressure vessels on board ships certified by Germanischer Lloyd, e.g. steam boilers, and also industrial plants and pressure chambers such as those used in medicine.

**A MAN WITH A MISSION** Pauli describes his work with the MIR as a “highlight”, but also as a great challenge that directs and shapes his other tasks in the certification of research, rescue and tourist submersibles as well as systems for military submarines. Nevertheless, they were found to be more than adequate. “A tourist submersible intended for 48 passengers is something completely different as regards fundamental design. You work on it in your office; it may well be that you have to test it in the water in the Krylov Institute which is filled with water, the spheres have to contend with the crushing pressure of, believe it or not, 750 bars. ‘In fact,’ says Pauli, ‘we never come close to that pressure, even at 2,000 metres below the waves.’

The MIR is a reliable instrument, for military submarines also prescribes a test with an additional increase of pressure for the ‘rated diving depth’, the pressure test for acceptance of the ‘rated diving depth’, the pressure test for acceptance of the ‘rated diving depth’, the pressure test for acceptance of the ‘rated diving depth’, the pressure test for acceptance of the ‘rated diving depth’. The MIR is a reliable instrument, for military submarines also prescribes a test with an additional increase of pressure for the ‘rated diving depth’, the pressure test for acceptance of the ‘rated diving depth’, the pressure test for acceptance of the ‘rated diving depth’, the pressure test for acceptance of the ‘rated diving depth’. For instance, Pauli is even contacted by amateur enthusiasts who have a passion for underwater craft and are itching to build their own submersible. There are many, many of them, and some drop by to ask: ‘Could you just check this for me?’

**When Inspectors Take a Dive**

In order to test divers, Pauli works on a large test chamber for generating extreme pressures, “Rules for Classification and Construction, Underwater Technology – Submersibles” by Germanischer Lloyd. Pauli explains: “The hull of a conventional submarine does not have a spherical shape; it is roughly cylindrical. And a cylinder fundamentally cannot withstand as much external pressure as a sphere. Designing such hulls calls for complex mathematics. Take a look at this page here: the calculations of these cylindrical – and even more complex – geometries means you will be dealing with lots of sine, cosine and hyperbola functions. Luckily, I am assisted by colleagues in the department with experience in underwater technology, namely Karsten Hagenah, Dirk Pohlmann and Dr Robert Surma.”

Sometimes, Pauli is even contacted by amateur enthusiasts who have a passion for underwater craft and are itching to build their own submersible. There are many, many of them, and some drop by to ask: ‘Could you just check this for me?’

**Technology worthy of the navy, plus an official loading test by Germanischer Lloyd:** this is the story of the development of a diver’s watch made of submarine steel.

Pauli’s department is also responsible for all pressure vessels on board ships certified by Germanischer Lloyd, e.g. steam boilers, and also industrial plants and pressure chambers such as those used in medicine.
After obtaining his doctorate on “Examinations on the pitting corrosion of nitrogen-alloyed austenitic chrome-nickel-molybdenum steels in aqueous solutions containing chlorides”, Bernhard Richter devoted several years to scientific research into corrosion at the Fraunhofer Institute for Manufacturing Technology and Applied Materials Research (IFAM) in Bremen-Lesum, after which he joined Germanischer Lloyd on 1 July 1977. Dr Richter soon became Germanischer Lloyd’s specialist for the corrosion susceptibility of welded connections, discovering his love of wind energy in the process. It was with his work and the GROWTH project in Kaiser-Wilhelm-Koog that the expert activities of Germanischer Lloyd began in the field of wind energy. During the eighties, Dr Richter then created a sound basis for the later success of GL WINDTEST, not only through his active involvement in standardization bodies, but also through his participation in research and development projects for load models, measurement and the first guidelines. In 1984, he initiated the establishment of a test field in Kaiser-Wilhelm-Koog and, a year later, the systematic expert appraisal of wind turbines in Germany in accordance with the building regulations and the first certifications of Danish plants. In 1989, he actively promoted the founding of WINDTEST Kaiser-Wilhelm-Koog with participation of the federal state, the district, the municipality and the then power utility Schleswag. In January 2002, Bernhard Richter became head of the new area “Industrial Services” with operational responsibility for oil and gas, certification, wind energy, testing laboratories and civil engineering consultancy. The various technical departments are part of a modern, highly uniform structure. “No gust of wind could throw him off track when he was fired up with enthusiasm for an idea. Doubts and reservations were simply blown away. He was ready to make decisions, to seize opportunities and to implement clear-cut business plans,” is how Rainer Schöndube, Member of the Executive Board and Managing Director of Germanischer Lloyd, described Bernhard Richter at the official farewell ceremony.

A celebration was held recently to mark the inauguration of the extension building for WINDTEST (WTK) in Kaiser-Wilhelm-Koog with an office area of 400 sq m. The conference was chaired by Dr Manfred Feyer, Managing Director of Germanischer Lloyd Prüflabor GmbH, who presented a paper on “Damage in Ship Operation Technology”, which took place this year on 19 and 20 September in Würzburg. The conference proceedings “VDI Reports No. 1,898” also contains an article on “Quality Assurance, Quality Management and Integrated Management Systems” by Bernhard Ständer, Managing Director of Germanischer Lloyd Certification GmbH. For further information, Dr.-Ing. Manfred Feyer, Managing Director of Germanischer Lloyd Prüflabor GmbH, Phone +49 2832 988213, feyer@glplabor.de and Bernhard Ständer, Managing Director of Germanischer Lloyd Certification GmbH, Phone +49 40 36149-124, bernhard.staender@gl-group.com.

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INDUSTRIAL SERVICES IN CHINA

ROMANTICS LAMENT: “The world, especially as regards consumer goods, is becoming uniform and grey.” Impersonal branches of McDonald’s and Pizza Hut have displaced the old-fashioned snack bars and food stalls – whether in London or Beijing. Certainly, this trend cannot be ignored. And yes, uniformity does bring with it a certain dealness. But uniformity in heavy industry yields nothing but benefits and is simply indispensable for continued globalization. Without standards, the equipment parts and machinery produced in different countries would not fit together. Standardized materials and components are what make international competition possible in the first place.

As an independent, accredited service provider, Germanischer Lloyd Industrial Services (GLIS) certifies compliance with technical standards and requested quality characteristics – provided they have been met by the manufacturer, of course. The aim of this procedure is to make it easier for the customer and purchaser of the goods to assess all the worldwide suppliers, and spares the suppliers regular supervisory visits by their customers. GLIS is particularly active in the fields of oil and gas, wind energy, materials, failure analysis, civil engineering, fire protection, and the certification of management systems. Services for all of these fields are offered by the Shanghai Area Office, which opened in September 2005. At present, the focus of attention is on Germanischer Lloyd Oil and Gas (GLO) and Germanischer Lloyd Certification (GLC).

HOT OPPORTUNITIES IN THE CHINESE ENERGY MARKET “The outlook for GLO in China is excellent – it’s a huge market,” says Hartwig Schönbach, Managing Director of GLO. China is “energy hungry”. In 2003, the country overtook Japan as the world’s second-largest consumer of petroleum products. In 2004, about 6.6 million barrels of oil were used per day, and in 2005 this figure grew to 7.2 million – a rise of nine per cent. Not only is the demand for oil rising, the supply of gas is becoming more and more important. Owing to the country’s lack of its own reserves, hydrocarbon imports are increasing steadily, and these commodities have to be transported far into the hinterland of China to stem the rural exodus. In this energy sector, Germanischer Lloyd seeks to

Without the safeguarding of worldwide standards by providers of industrial services, global production outsourcing would be much more complicated, and perhaps even impossible. To keep pace with the rapid development of the economy in the Middle Kingdom, Germanischer Lloyd’s Industrial Services unit is now represented with an office in Shanghai.

PHOTOS: GERMANISCHER LLOYD

The endoscope is an important tool for the inspectors in obtaining an impression of the internal condition of machinery and plant components

Rapid response and service on the spot: the Area Office in Shanghai (top), Below: Now also in China: certified by GL

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Rapid response and service on the spot: the Area Office in Shanghai (top), Below: Now also in China: certified by GL
The task of Industrial Services are not laws. The staff of Industrial Standards are not laws. The code is used to certify that management systems are able to maintain an unbroken chain of refrigeration. For perishable goods, it is important to ensure that the temperature remains constant in every link of the transport and storage chain, no matter how small in the trucks, on the ships and also in the distribution centres of the airports. The standard can be requested free of charge on the website, so that potential customers can conduct a preliminary examination themselves.

THE MARKET IS THE LAW Standards are not laws. The International Organization for Standardization (ISO) in Geneva, which has many thousands of international standards stored in its database, is not a statutory authority. Compliance with these standards is voluntary. But whoever wishes to succeed in the market will make every effort to satisfy these standards – or risk losing customers. Many large companies only accept vendors who conform to ISO 9001. Very often, they look at both the certificate and the certification body. When the auditors of Germanischer Lloyd are carrying out an audit, they not only examine the actual product, but also a variety of other aspects.

THE FUTURE OF GLC WITH ISO 9001 The task of Germanischer Lloyd Certification (GLC) in China will be to certify management systems. The manufacturing processes, product safety, and materials testing form the traditional hunting ground for the "standardization engineers". But not on the front line. GLC is concerned with ISO 9001 – this code standardizes the methods by which companies are managed and does not refer to a particular product. The system can be applied to all sorts of enterprises, from the manufacturers of wind turbines to noodle makers and service providers like airlines. The auditors focus on the operational sequences: Are the staff adequately trained? Do the organizational sequences function smoothly? What about delivery dependability and reliability? “The system should function like a closed-loop control circuit – each link in the chain must fit perfectly,” says Bernhard Ständer, Managing Director of GLC. “We do not explain how the standards are actually to be implemented. If we did, we would no longer be independent inspectors and auditors. But we are able to recommend consultants for this work. And there are many good consultants to be found in China.”

And that not only applies to ISO 9001 but also to all other standards. What is more, Bernhard Ständer expects an increase in demand for environmental management certification systems according to ISO 14001 for China.

ON SITE IN THE MIDDLE KINGDOM The staff of Industrial Services could fly from Hamburg to China whenever needed. That would indeed be time-consuming, but it would be possible. The orders already handled in the past have proven this. For instance, Germanischer Lloyd Bautechnik was involved in the feasibility study for the ship lift at the Three Gorges Dam. And GLC recently certified the Chinese subsidiary of Mühlhan, a specialist in surface treatment, according to ISO 9001. Nevertheless, Industrial Services decided to open an office in Shanghai. “We wanted to be as close as possible to the customers,” says Manfred Bernitt, Manager in Shanghai. He views this as being part of the service package. Besides, Germanischer Lloyd has a keen interest in obtaining a better insight into the Chinese market. Initially, the staff in Shanghai will spend a lot of time introducing themselves to the various authorities and companies in the area. To start with the client base will consist mainly of German or European firms manufacturing in or exporting to China. In the long run, however, the objective will be to cultivate the cooperation with Chinese partners in a targeted way. ■

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Wind speeds at a height of 80 m

1 (V<5.9 m/s)
2 (5.9<V<9.9 m/s)
3 (6.9<V<7.9 m/s)
4 (7.5<V<8.1 m/s)
5 (8.1<V<8.6 m/s)
6 (8.6<V<9.4 m/s)
7 (V>9.4 m/s)

Sometimes the wind blows, sometimes it doesn't. For this reason, wind energy can never provide a real alternative to nuclear or coal-fired power stations – as an oft-repeated argument against this sustainable form of energy goes. However, a study published recently by Cristina L. Archer and Mark Z. Jacobson, two researchers at Stanford University in California, has attracted worldwide attention, because it proves that precisely the opposite is true. "nonstop" spoke to Cristina L. Archer.

What does this mean for the advocates of wind energy?

Well, the main implication of our study is that the potential for low-cost wind energy is more widely available than was previously recognized. What we are also saying is that you don't have to cover the entire earth with wind turbines: if we were able to generate wind energy from just these 13 per cent, we would theoretically get a total of 72 terawatts of electrical power. A terawatt is 10^12 watts or 1,000 billion or a million million watts. And 72 terawatts is forty times the current global consumption of electrical energy.

So how many wind turbines do we need for our current level of consumption?

You would need 48 million 1.5 MW turbines to retrieve the 72 TW of wind power available in the wind. But that's more power than we can possibly use. If you just wanted to satisfy the world's energy needs, then you'd only need about 19 million such turbines. And if you only wanted to cover the globe's electricity needs, then the number would be about 2.4 million turbines.

One of the main arguments put forward by critics of wind energy is that the wind blows too erratically for us to rely completely on this form of energy – what do you say to that?

We have analysed a method by which this intermittency can be minimized. It is actually quite a simple procedure for connecting wind farms to each other. Even if a particular wind farm were performing below standards, there would be enough wind at some other site. So, the more farms you can link up, the greater the probability that there will always be enough wind energy in the entire system. We have analyzed this situation for the USA and are currently working on a refined statistical model. What if the wind suddenly blows with all its might, like the recent trio of hurricanes called Katrina, Rita and Stan? Turbines cannot operate with the strong winds that typically occur during hurricanes – e.g. 50 m/s. The 1.5 MW turbines I have been dealing with are typically programmed to stop at wind speeds greater than 25 m/s, to avoid damaging the turbines themselves. Although they will not generate power with hurricane winds, turbines are designed to withstand these storms without being damaged.

Is this wind map at the same time a chart for investment decisions? Does it really show planners the best locations for their new plants?

Yes, definitely. Particularly in the more remote areas, such as the developing countries, our map provides a good guide. However, I have also just received an enquiry from an investor who is looking for possibilities in British Columbia. In fact, the potential for wind energy is exceptionally good over there. Incidentally, just because some regions on our map don't have a dot doesn't mean that they are not suitable for wind energy. It just means we don't have any data for them yet. So this is another reason why I think our estimates are on the conservative side.

Have there been any reactions to your work yet?

Well, I am a scientist and the study is of a scientific nature, and so I was very surprised at the detailed coverage it received from the media in our country. Although I don't think our President has read the study, it has already been debated in the American Congress.
The certification of management and environmental systems boosts for quality and customer focus. The manufacturing logistics service provider Jungheinrich applies this factor all over Europe – even in sales. “nonstop” spoke to Erich Nitzsche, Head of Quality Management at the Hamburg group.

WHEN TOPFLIGHT manufacturing logistics, racking technology and material flow analysis are needed, Jungheinrich is the number 1 in Europe and amongst the top 4 in the world. With forklift trucks, shelving systems and services for the complete intralogistics sector, this listed company has an annual turnover of about 1.6 million euros (about 50 per cent in export) and employs a workforce of some 9,000 worldwide. In 2004, production was reorganized to be concentrated entirely in Germany: three facilities now produce the hardware on which Jungheinrich’s enviable reputation as a premium manufacturer and innovative leader for efficiency, performance and ergonomics is founded. The products are embedded in a full-service range which stretch- es from the financing and rental to fleet management and the used equipment trade. With its successful single-brand “Made by Jungheinrich” strategy, the company stands out from the competition. One aspect that is at least as important is worldwide direct sales. It unites the entire sales organization, including services, under one umbrella. “There are no intermediary traders who might reduce the quality – a situa- tion the automobile industry can only dream of,” says Erich Nitzsche. “ Thanks to our 3,000 technicians with mobile workshops spread all over Europe, we constantly have our finger on the pulse of the market. The 200,000 service reports submitted by the technicians are a gold mine of information for quality management, production and develop- ment.” Recently, the process-oriented organization of Jungheinrich Direct Sales was examined by Germanischer Lloyd Certification GmbH on the basis of ISO 9001:2000, and its customer focus and efficiency were confirmed by the “Sales and Services Europe” certificate with Europe-wide validity. Jungheinrich clients can rely on a uniformly high level of service quality throughout Europe – and on the qual- ity and environmental management system of the production facilities, which was also certified by GLC. “This strengthens our brand confidence,” Nitzsche emphasizes.

THERE’S EARNING POWER IN SERVICE The beneficial effects are reflected not only in the company’s market success, but also in the bottom line. This is because the after-sales serv- ice and the sales-related services make an important contrib- ution. Their success depends on the smooth delivery of spare parts: orders placed by 4 p.m. are already delivered the next day via two large distribution centres. This also repre- sents an advantage for the Jungheinrich rental fleet, which is unique throughout Europe with 16,500 vehicles in 40 ver- sions and an average age of only 1.5 years. All through the service business, which also includes the planning of com- plete warehouses with materials handling technology and control units, the full-service concept is increasingly becom- ing established: all-in-leasing with fixed rates over a defined period of use. In Great Britain, for example, the share is already 70 per cent of the overall market. In Germany, this figure is 45 per cent – and rising. “As a result, the after-sales business is shifting into this area,” says Erich Nitzsche. “In turn, this is boosting quality: the lower the service effort in the field, the more economically we can operate.” Here, Nitzsche can point to first-class figures. “As many as 70 per cent of our vehicles have still not seen a repairman after half a year.” And yet the continuous improvement process means Jungheinrich cannot rest on its laurels: the standards are constantly being advanced, checked by intermediate audits and implemented in the steadily growing organization. They are of particular benefit as control instruments in change management and in the transfer of best practice experience. The sweeping use of SAP, for example, provides a safeguard to prevent individual countries and markets from “subopti- mizing”. At the same time, an efficient steering tool is creat- ed. Inventory levels for the whole of Europe can be managed efficiently by employing home-grown skills. “If certain areas are working particularly effectively, we can easily analyse the reasons for this success and then apply them as best practice to other locations.” Despite all this streamlining, Jungheinrich gives its staff an exceptional degree of leeway. “Our performance then characterizes the roles perceived by the play- ers. The Jungheinrich quality manager sees himself primar- ily as a facilitator and internal adviser. “Exactly how the var- ious processes should run is something the people directly affected know best of all.” As the certifying body, it is GLC’s job to confirm whether the chosen model conforms to the ISO standards; however, GLC can make use of the available leeway. The certifier’s wide-ranging experience means the company also benefits from the implementation. “The fact that GLC is “in the loop” throughout the Jungheinrich Group offers additional rewards. Uniform standards are also conveyed to the auditors more easily than dissimilar ones, which again promotes the certification process. Dealing with the special characteristics of certain countries is also facilitated. The environmental certification of the German sales unit according to ISO 14001 is a textbook case. It was carried out successfully despite the differences in environ- mental legislation applying in the various federal states. “Besides the economic aspect, this experience proved to be very valuable for the later EU-wide implementation. It also gave us important insights for the subsequent environmental assessment,” is how quality manager Nitzsche sums up the added benefit.

DECISIVE ACTION WITH A FOCUS ON CUSTOMERS AND RESULTS In modern standardization practice, a focus on both customers and results enjoys much higher value than pure procedural formalism. An orientation towards achieving superior per- formance then characterizes the roles perceived by the play- ers. The Jungheinrich quality manager sees himself primar- ily as a facilitator and internal adviser. “Exactly how the var- ious processes should run is something the people directly affected know best of all.” As the certifying body, it is GLC’s job to confirm whether the chosen model conforms to the ISO standards; however, GLC can make use of the available leeway. The certifier’s wide-ranging experience means the company also benefits from the implementation. “The fact that GLC is “in the loop” throughout the Jungheinrich Group offers additional rewards. Uniform standards are also conveyed to the auditors more easily than dissimilar ones, which again promotes the certification process. Dealing with the special characteristics of certain countries is also facilitated. The environmental certification of the German sales unit according to ISO 14001 is a textbook case. It was carried out successfully despite the differences in environ- mental legislation applying in the various federal states. “Besides the economic aspect, this experience proved to be very valuable for the later EU-wide implementation. It also gave us important insights for the subsequent environmental assessment,” is how quality manager Nitzsche sums up the added benefit.

For further information: Jens Rogge, Germanischer Lloyd Certification, Phone +49 40 36149-555, jens.rogge@gl-group.com

Dream Team for Manufacturing Logistics
Haul Away, Joe!

Long ago, shanties were sung to make the gruelling work easier for the sailors. A good ear was not required; all that mattered was getting some rhythm and momentum into the heave.

“IF A MARINER on one of the old tall sailing ships had told his shipmates how people would be collecting and celebrating their rough-and-ready work songs only a hundred years hence, his mates would have dismissed it as an old yarn. Nowadays, people sit in front of a box with a glass window and watch how fairly professional singers in blue and white striped fishermen’s smocks belt out, to an accordion accompaniment, songs that are announced to be genuine seamen’s shanties. But the real seamen of the time were seldom blessed with a good voice, because their throats were parched from the wind and salty water (which is why they needed that grog). Some even say that they sucked lozenges which are known as the “fisherman’s friend” and so strong that they made landlubbers gasp for air. So when those old salts sang, it was usually only to make the work go easier. Life at sea in the “good old days” meant having to pull all sorts of ropes – also called sheets, strangely enough – as well as scrubbing the deck and knocking rust off the old tub. Sails had to be set, furl, guyed and braced up. Even when technical aids such as winches and capstans were used, these were so difficult to operate that they could only be moved through the combined efforts of several men. What was needed here were rhythms to synchronize the work of all the “hands”. Such songs were as boring in their endless repetition as the labour they were meant to assist, and their verses as countless as the shipboard jobs to be done. Often, a lead singer would do the verses, while his comrades putting in with the refrain and the sudden muffling or halting. Fine melodies and well-trained voices were neither necessary nor provided. So what is a shanty really? Well, you could begin by saying: “Imagine ten men hauling a rope ...” Sea-farers also picked up many wonderfully evocative songs from other nations, together with the name for the entire genre of maritime chants, which is said to originate from the French word “chantez”. The melodies and rhythms were dictated by the task at hand, and the texts were made up and modified by the seamen themselves. Often, their hopes and desires were woven into the lyrics, which could also be a pooing account of their tavern experiences in the last port or about the everyday drudgery on board. Such a shanty was composed at the end of the 19th century by the sailor Robert Hildebrand on the Hamburg three-master “Magellan”. In harsh terms, he criticized the poor condition of the ship and the bad food coming out of the galley, and even poked fun at the miniscule and bony legs of the captain. In response to his artistic efforts for occupational safety, three months’ wages were docked off his pay. It would have been no small satisfaction for him to know that his song is now a standard for shanty choirs and beer-soaked yachting crews. You may recognize this classic – it begins with the Low German words “lick below me Hamburgh Veyermaster seyn” (Oh, I once saw a four master from Hamburg). Sadly, Hildebrand did not live to enjoy the resounding success of his inspiration; he was shipwrecked and drowned in 1888. — BF —