Germanischer Lloyd

nonstop

The Magazine for Customers and Business Partners

EDITION 4 · 2005

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

PHOTO: STEPHANIE BRINKKOETTER

Dear Readers,

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.

Rainer Schöndube

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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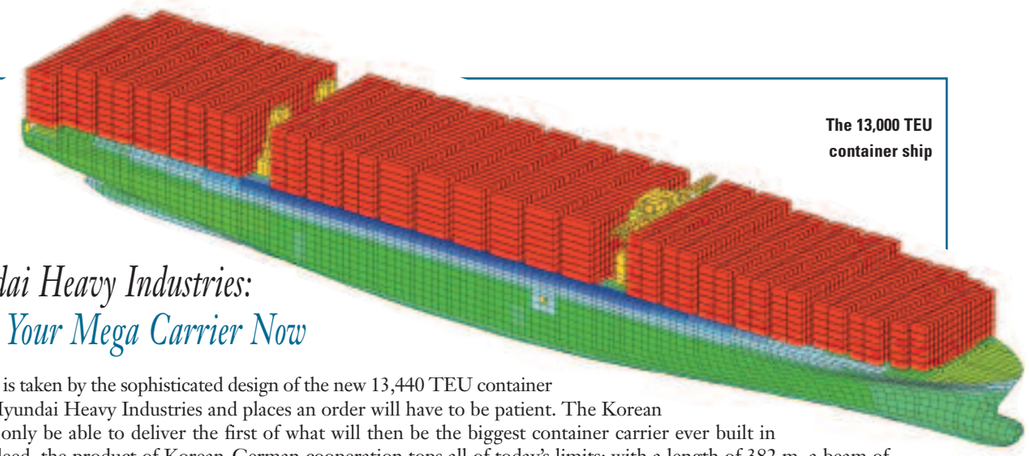
News from Maritime Services



The 13,000 TEU container ship

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 25.5 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 36149-537, jan-olaf.probst@gl-group.com

I.M. SKAUGEN

Innovative Tanker on Order

Morits Skaugen jnr and Hergen Thielemann signing the contract

Skaugen 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. Skaugen Group is one of the major players. In September, the contract was signed in Singapore by Morits Skaugen jnr, Chief Executive Officer, and Hergen Thielemann, Division Manager East Asia of Germanischer Lloyd. With the expansion of its fleet, I.M. Skaugen 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 m^3 for liquefied gas or chemicals, together with seven coated tanks of 3,900 m^3 for organic chemicals. The total capacity will thus be 9,700 m^3. The ships have a maximum draught of eight metres and a deadweight tonnage of 10,200.

PHOTOS: CORBIS (TITEL), GERMANISCHER LLOYD (2)

Hoe Eng Hock, Executive Director of Keppel-Singmarine Singapore, Hergen Thielemann and Dr Hans G. Payer at the awards ceremony

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 Tanthuwanit, the founder and the president of Regional Container Lines Public Co. in Thailand. As a leading member of the Thai Shipowners' Association, Mr Tanthuwanit is also the Chairman of Germanischer Lloyd's ASEAN Committee. The Shipbuilding Yard prize was awarded to Hyundai 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 Maritime Asia Awards returned to Singapore, the birthplace of the journal. This year's glittering gala evening coincided with World Marine Day and took place at the Shangri-La Hotel. Next year, Kuala Lumpur will host this prestigious awards ceremony.

MARE FORUM

Maritime Image Problem?

Sufficient fuel for discussion was provided at the Mare Forum, which took place in middle of September in Rome. With the motto "Shipping in a Responsible Society – Quo Vadis?", it touched on almost all aspects currently making the headlines. The freedom of the seas is being curtailed on many fronts. International regulations, regional provisions and new codes are forcing shipowners to implement greater safety and quality in operating their ships. The possibilities for monitoring ship traffic are increasing and government institutions are broadening their maritime mandates. Besides addressing other topics, the forum discussed whether the pressure on shipowners and shipping companies could be increased through higher harbour fees for substandard ships. The aim was to prevent the image of the entire maritime industry from being tarnished by a few black sheep. Questions of liability and the criminalization debate were also tackled, as was the effectiveness of maritime anti-terrorist measures. Apart from offering the possibility of spotlighting the foremost improvements in the safety of shipping, the Mare Forum also provided an arena for analysing future challenges. For further information: Wolfgang Klose, Head of New Accounts & Markets, Phone +49 40 36149-7527, wolfgang.klose@gl-group.com

Ould El Moctar

AWARDS

The Landrini Prize Goes to ... Ould El Moctar

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 Manoeuvring 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 36149-1552, ould.el-moctar@gl-group.com

PHOTOS: MICHAEL BOGUMIL (1), GERMANISCHER LLOYD (4)

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.

The cooperation between Germanischer Lloyd and the China Classification Society was agreed in the presence of representatives from the China Shipping Group and Hudong-Zhonghua

HUDONG-ZHONGHUA SHIPBUILDING

Series of 8,530 TEU Mega Carriers with Dual Class

The largest container ships ever planned in China will be built in cooperation with the China Classification Society (CCS). The project-related teamwork involves four newbuildings which were ordered last December by the China Shipping Group for service under the Chinese flag. Construction of the first unit is planned to start in July 2006, with delivery due in October 2007. The design of the container ship (LOA 334 m, width 42.8 m, draught 14.65 m) is a result of the joint efforts of the Hudong-Zhonghua yard and Germanischer Lloyd. With these newbuildings, the yard is joining the top league of shipyards. For further information: Hergen Thielemann, Division Manager East Asia, Phone +86 21 63915858, hergen.thielemann@gl-group.com

Rainer Schöndube, Senator Gunnar Uldall, Dr Hermann J. Klein and Heiner Limbrock, architect of the "Johannis–bollwerk" offices

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 Uldall, together with Rainer Schöndube, 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.

COMPANY INTERESTS

New Software Products

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 Clearance considerably reduces the time needed to prepare port documents, while increasing their quality and accuracy. For further information: Wolfhard Sengler, Head of Information Technology and Organization, Phone +49 40 36149-9052, wolfhard.sengler@glgroup.com

Certificate ceremony in Rotterdam: Hartmut Kuhn, GL Hamburg; David A. Slager, Chairman of the Board and CEO, Radio Holland Group Rotterdam; Ron Kampinga, GL Country Manager Netherlands; Henk Middelkoop, QA Manager, Radio Holland Marine, Rotterdam; Harald Seibicke, GL Area Manager Benelux/North-West Europe (left to right)

ROTTERDAM

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/Northwest Europe, Phone +31 10 2040404, harald.seibicke@gl-group.com;www.radiohollandgroup.com

Trade Fairs

JANUARY

31 January – 3 February, 2006, Sydney, Australia
Pacific 2006, International Maritime Conference
www.pacific2006imc.com

FEBRUARY

21 – 24 February, 2006, Hanoi, Vietnam
VietShip
www.vinashin.com.vn

MARCH

30 March– 2 April, 2006, Istanbul, Turkey
Exposhipping
www.itf-exposhipping.com

13–16 March, 2006, Miami Beach, USA
Seatrade Cruise Shipping
www.cruiseshipping.net

22–24 March, 2006, Singapore
Asia Pacific Maritime
www.apmaritime.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.

Members of the committee on tour: Jens Schreiter, GL Ship Type Manager Passenger Ships; Peter Cairns, President Shipbuilding Association of Canada; Serge Desrosiers, Production Manager Verreault; Michael Hubbard, Consultant International Maritime Organization; Hugues Mazhari, Area Manager Canada; Andrew Kendrick, Vice President BMT Fleet Technology Limited; Fritz Grannemann, GL Division Manager Americas; Christian Nath, Managing Director GL Wind and Capt. Richard Beaupré, President Verreault Navigation (left to right)

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: Denise 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 members toured the yard, informing themselves about ongoing projects and the high quality standard achieved by this family-owned enterprise. They also 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 Sönke 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 best 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 standards 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

Lothar Tillack, Director of the Federal Office of Defence Technology and Procurement (left), and Lorenz Petersen, Head of the Naval Projects Department at Germanischer Lloyd

PHOTOS: MICHAEL BOGUMIL (1), GERMANISCHER LLOYD (2), DOCKSTAVARVET (1)

Personnel News: 15 Years on the Bridge

Rainer Schöndube has been a Member of the Executive Board since 1990. Together with this "board jubilee", his 25th anniversary of service was celebrated on schedule in October. After studying business administration, Rainer Schöndube began his career as a tax consultant and chartered accountant at the auditing firm Treuarbeit AG. In 1980, he joined Germanischer Lloyd as Commercial Director, becoming a Member of the Executive Board in 1990. Since 1996, he has held an honorary position on the Board of the German Asia-Pacific Business Association (OAV) in Hamburg and has acted as commercial judge at the Regional Court of Hamburg. In his capacity as honorary consul, he has represented the interests of the Kingdom of Belgium in the Free and Hanseatic City of Hamburg since 1997. In addition, Rainer Schöndube is Vice-President of the famous Hafen-Klub in the Hanseatic City and is also on the Trustees' Committee of the Curatory Foundation for the "Hospital of the Holy Ghost" in Hamburg. To honour his wide-ranging services to the community, the Senator for Economy and Labour of the Free and Hanseatic City of Hamburg, Gunnar Uldall, presented Rainer Schöndube with one of the highest decorations of the Hanseatic City – the "Portugaleser". This medal is awarded by the Senate on the occasion of state visits or jubilees and is based on a large gold coin (portuguez) with a value of ten cruzados, first minted in 1479 by Portugal after it had become wealthy from its colonial possessions.

Senator Gunnar Uldall honours Rainer Schöndube with one of Hamburg's highest decorations: the "Portugaleser"

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, Hamburg (ISBN 3-7822-0908-7)

The Wide and Wonderful World of Marine Engineering

The profession of ship's engineer 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 generally authorized 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 budding marine engineers. Klaus Bösche, Karl-Heinz Hochhaus, Herwig Pollem, Jürgen Taggesell et al. (editors): "Dampfer, Diesel und Turbinen. Die Welt der Schiffsingenieure." Published by the German Maritime Museum through Bremerhaven und Convent Verlag GmbH, Hamburg (ISBN 3-934613-85-3)

GL Academy

Germanischer Lloyd offers a comprehensive training programme for marine superintendents, quality managers, crewing managers, maritime training facilities, seafarers and the staff from shipping administrations and yards

DECEMBER 2005

01-02.12.2005, Hamburg
CSO/SSO for Yachts

01.12.2005, Hamburg
ISPS for Shipyards

06.12.2005, Hamburg
Emergency Preparedness and Crisis Management

07.12.2005, Hamburg
Machinery – Damage, Repair and Maintenance

13.12.2005, Hamburg
Maritime Casualty Investigation in Shipping Companies

15.12.2005, Hamburg
Maritime English Basics for Superintendents

JANUARY 2006

10.01.2006, Hamburg
Shipping Basics for Banks

11.01.2006, Hamburg
STCW Basics

12.01.2006, Hamburg
Introduction to Crewing

17–18.01.2006, Düsseldorf
Shipping Basics

18.01.2006, Hamburg
Oil and Chemical Tankers – Technical and Operational Aspects

19.01.2006, Hamburg
Managing Newbuildings

24.01.2006, Hamburg
Risk, Liability and Insurance for Shipbuilding and Repair

25.01.2006, Hamburg
Practical Aspects of Corrosion Protection for Shipping Companies and Shipyards

30–31.01.2006, Hamburg
Risk Management, Product Liability and Prevention Strategies for Design, Process, Production and Maintenance Engineering (FMEA/RCA)

31.01.2006, Hamburg
Port State Control Basics

FEBRUARY 2006

01.02.2006, Hamburg
Bridge Design, Equipment and Arrangement

01–02 and 08–09.02.2006, Hamburg
Shipping Basics

07.02.2006, Hamburg
Ballast Water Management

09.02.2006, Hamburg
Technical Risk Analysis in Shipbuilding and Ship Operation

09–10.02.2006, Kiel
Shipping Basics

14.02.2006, Hamburg
Introduction to the Requirements of the Aerospace EN 9100 incl. Authority Requirements

15.02.2006, Hamburg
ISM Basics

16.02.2006, Hamburg
ISPS Basics

28.02–01.03.2006, Hamburg
ISPS Internal Auditor for Port Facilities

MARCH 2006

01.03.2006, Hamburg
Waste Management

08.03.2006, Hamburg
Emergency Preparedness and Crisis Management

14.03.2006, Hamburg
ISPS for Superintendents

15.03.2006, Hamburg
High-Speed Craft (HSC) – Technical and Operational Aspects

16.03.2006, Hamburg
Quality Objectives and Continuous Improvement

21.03.2006, Hamburg
Ship Operation, Claims and Insurance

22.03.2006, Hamburg
Basics about DIN EN ISO 14001 for Shipping Companies

23.03.2006, Hamburg
Internal Auditor DIN EN ISO 14001 for Shipping Companies

27–28.03.2006, Hamburg
CSO/SSO

29.03.2006, Hamburg
Port State Control Basics

30.03.2006, Hamburg
Introduction to the System of Maritime Regulations

31.03.2006, Hamburg
Inspections, Surveys and Certificates

For further information: GL Academy, Phone +49 40 36149-195, academy@gl-group.com or on the Internet at www.gl-group.com > Maritime Services > GL Academy

PHOTOS: KOEHLERS VERLAGSGESELLSCHAFT (2), GERMANISCHER LLOYD (2)

The order books of Chinese yards are already full up to 2008

Always on the Spot in the Middle Kingdom

It won't be long before China is the number one in shipbuilding. This is of course only the plan – but the people who drew it up were no daydreamers. The developments are going in the right direction, and very quickly too. After watching the market very closely, Germanischer Lloyd has already fielded a large and capable team.

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

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, whilst 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

PHOTO: NORA LUTTMER (1), GERMANISCHER LLOYD (1)

concerned." Of the 2.000 shipyards in the country, Thielemann believes that about ten per cent are potential export yards.

A large proportion of the ships being built today are already intended for export – many of these for German shipowners. And this also means that Germanischer Lloyd's books reflect many newbuilding orders in China – in June 2005, 291 ships were listed for fabrication there up to and including 2008. Reason enough to enlarge the presence of the Hamburg classification society in China even further.

GL's first activities in the People's Republic date back to 1869, with own representation in place since 1994. As of July 2005, there are now six stations with a total of 135 employees. In 2004, the regional office for the Division East Asia was relocated from Singapore to Shanghai.

Besides China's growing significance for the global shipping industry, the favourable geographic position of Shanghai was an important criterion for this move. After all, Korean, Japanese and Chinese yards build about 81 per cent of the newbuildings that make up the order books of Germanischer Lloyd. Singapore is simply too far away, but why was a city in Korea not chosen for the new headquarters of Division East Asia? Why not Pusan? Hergen Thielemann is not the only expert who is convinced that China will, in the long run, become the largest market for newbuildings.

Hergen Thielemann, Division Manager East Asia

CHINA'S BOOM The Chinese government has announced that it aims to make China the number one shipbuilding nation by 2015. Until this goal is reached, the Chinese yards have been exhorted to produce 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. Estimates indicate that the next record will be set in 2005, with 10 million dwt and a market share of 17 per cent.

Although Chinese yards mainly built simple feeders 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 300,000 dwt VLCCs and Waigaoqiao 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 economy is the order of the day: in 1999, Beijing prescribed competition 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 production.

CSSC and CSIC organize framework programmes on a gargantuan scale, because capacities cannot be maximized solely through more efficient workers and improved management 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 downright 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, Germanischer Lloyd classifies all types of vessels, including multi-purpose ships up to 35,000 dwt, bulk carriers up to Panamax size, chemical tankers up to 37,300 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 3,400 TEU. The leap into the next league has already been taken. Germanischer Lloyd has received the order for the 8,530 TEU ships being built for the Chinese shipping company 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 project, Germanischer Lloyd is participating in the largest container 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 "material and component inspections" is also growing for Germanischer Lloyd. Fewer and fewer parts are being imported for the ocean behemoths. Local factories manufacture the switchboards, hatch covers and generators, and cast the rudder horns, stern frames, anchors, propellers and container 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 Waigaoqiao Shipyard in Shanghai. Right: Workers at the Wenchong yard in Guangzhou. Below: Yi Chong Xi is Deputy Director of Qingshan Shipyard in Wuhan. Here five ships, consisting mainly of feeders, multi-purpose ships and chemical tankers, are usually delivered every year

PHOTOS: NORA LUTTMER (3), GERMANISCHER LLOYD (1)

Chen Quingquiao (left) at the Wenchong yard talking to Johannes Jongebloed, Station Manager of Germanischer Lloyd in Guangzhou, the capital of Guangdong province

Always close to the customer: at present, Germanischer Lloyd is on the spot in Shanghai, Jiangyin, Nanjing, Wuhan, Guangzhou, Dalian and Hong Kong

GRAFIC: NONSTOP PHOTOS: NORA LUTTMER (1), LAIF (2)

the construction and expansion of repair yards and new port facilities all over the country is also acting as a motor for growth.

ALMOST A BIT TOO BIG 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, 51 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 Murken 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."

Shanghai (top) and Chongqing: only two of the megacities along the 6,300 km Yangtze River

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 newbuilding 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 busy 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 1,000 kilometres up the river, which means that it no longer belongs to the booming regions. "Compared with the coastal belts, we're a little behind here," says Jan Gosselink, Station Manager in Wuhan. The 13 surveyors notice this whenever they use the transport conurbation network. "From Wuhan, we have to cover an area that is half the size of Europe." It comprises all the central Chinese provinces: Hubei, Henan, Shaanxi, Chongqing, Sichuan, Hunan and Jiangxi. And yet there are no six-lane motorways or high-speed trains to interlink the cities. "You can only visit three or four suppliers a week – the rest of the time is spent on the road." Even for the work within Wuhan, the traffic situation becomes an obstacle course. The obsolete network of roads is overloaded. From the city centre to the yards at the perimeter, the taxi takes an hour to get through jams. But once you have arrived, the shipyards are quite impressive. For example, take Qingshan Shipyard, which also belongs to the state company CSC.

At present, five ships a year are delivered there, consisting mainly of feeders up to 1,100 TEU, multi-purpose ships of 12,000 tonnes and chemical tankers with 18,500 dwt.

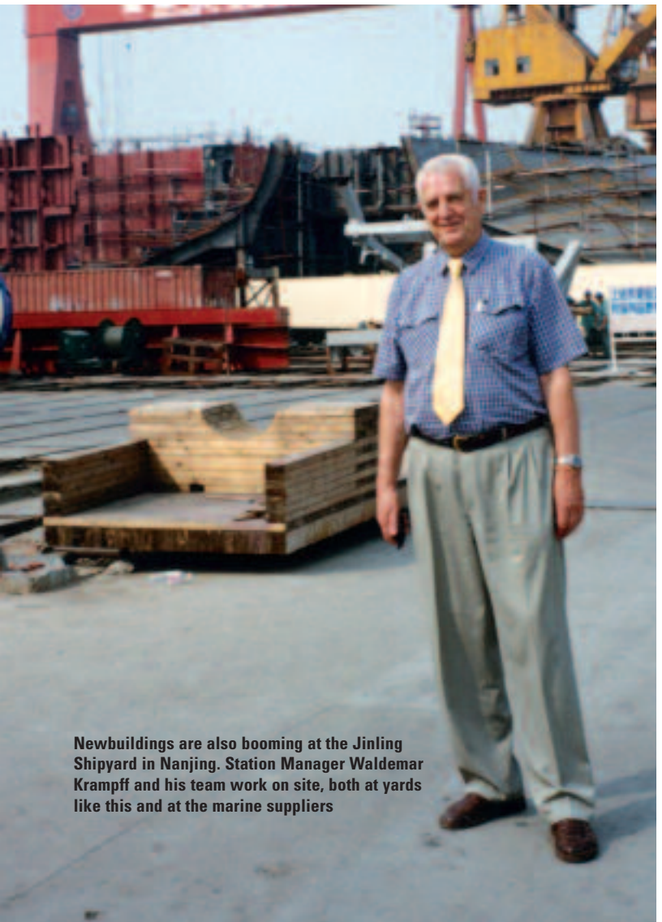
Since the yard possesses 2,200 metres of Yangtze river bank, it has the space for its expansion plans. The first step has already been taken: the construction of a dam is intended to regulate the water volume. This is because the ships are launched from the slipway via a canal into the river which, until now, had no water for several months of the year.

THE PEARL RIVER DELTA Since 2002, Germanischer Lloyd has been working from a base in Guangzhou, the capital of the south Chinese province of Guangdong. Guangdong is of particular importance to shipping – and not only because of its 3,368 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 carpet 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 shrewd merchants and businesslike 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.



Newbuildings are also booming at the Jinling Shipyard in Nanjing. Station Manager Waldemar Krampff and his team work on site, both at yards like this and at the marine suppliers

PHOTOS: NORA LUTTMER

"The first order only came in 2000 for a 30,000 dwt multi-purpose vessel at the old Dalian Shipyard," says Tian Tao, Station Manager in Dalian and responsible for almost the entire region north of Shanghai. The idea behind establishing the office was simply to be on the spot in good time. The north-east assumed a special shipbuilding role back in the nineties.

Dalian lies on the Bo Hai Sea. The "Bo Hai Sea Rim Economic Circle" also includes the port cities of Qingdao (although, strictly speaking, it does not lie on the Bo Hai Sea, but farther south on the Yellow Sea) and Tianjin. The latter is only one hour away from Beijing by car. This strip of coast is enjoying an exceptional level of investment in the maritime industries. For example, the South Korean group Hyundai Corporation acquired 51 per cent of Lingshan Shipyard – now called Qingdao Hyundai Shipbuilding – for $7.4 million US at the end of 2004. In the middle of June, Daewoo Shipbuilding and Marine Engineering (DSME), the second largest shipbuilder worldwide, announced that it would be investing $100 million US in the region for a module assembly plant. In Yantai, south of Dalian, the Yantai Raffles Shipyard – a joint venture with Singapore – is already proving successful. Together with a number of private investors, the local government of Tianjin is also providing funds: an annual sum of two billion renminbi for a total of six years. The aim is to have the port break through the ten million TEU limit by 2010. With a container volume of 3,814,000 TEU, Tianjin currently holds 18th place in the world ranking. Qingdao is at number 14, which means that there are many orders for the GL team in Dalian. "Material inspections at suppliers exhibited growth of 30 per cent during the first five months of 2005 alone in relation to the same period last year, with attendance to the fleet in service rising about ten per cent," Tian Tao is pleased to report.

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 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

Poster at Jinling Shipyard, Nanjing: "For the safety of the ship, make sure every working step is the right one."

thirds of the country has not even been touched by the upturn yet. If the government manages to pull the interior along with the coast, the boom will surely continue in the transport industry. In this connection, the yard managers are expecting further benefits from membership of the WTO. And Germanischer Lloyd is also banking on growth. At present, Germanischer Lloyd is only permitted to have an office in China, but it may be expected that the establishment of a subsidiary based on limited liability will become possible – this would facilitate the administrative work in particular.

Business and relaxation mix well at golf, even in China (top). Below: The port of Shanghai

BRIDGING THE CULTURAL GAP "You can't do business in China," is what many Western managers complain about. "The Chinese are simply too different." Exaggeration? "Cooperation must always begin at both ends," says Yao Dan of Station Jiangyin, referring to the teamwork between Germanischer Lloyd and its customers. "It is necessary to clarify exactly what we need and what the customer wants." Clear-cut answers to clear-cut questions – this is indeed possible in the Middle Kingdom. Language often proves to be an insurmountable barrier, which is the reason why some 70 per cent of the Germanischer Lloyd staff in China are locals.

But language skills are not everything – cultivating good personal contacts is also important; you have to get to know your business partners and build up an atmosphere of trust.

Getting to know people is often the problem. Picture this: at a business dinner, you and your foreign associates are still sitting half-frozen – and not only because of the arctic air-conditioning – around the big table, poking about with chopsticks in your fried fish with lotus and shrimps. Eventually, out of sheer embarrassment, you start fiddling with your cell phone. Not exactly the best way to break the ice! Hergen Thielemann has discovered a more relaxed way, one he recommends to all his staff: "Go and play golf! There you have no winners or losers, just different handicaps. You play together, learn together and have fun together." And it all works without a perfect understanding of the language. And then, when you meet one of these "golf buddies" later, you suddenly notice that you can sit together and chat and negotiate, completely relaxed. The ice has been broken. Another tip from the Director of Division East Asia: just use your common sense – and make an effort to be friendly! What starts off as tricky may turn out to be quite easy. China is a whole new world simply waiting to be discovered. ■ NL

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, Guangzhou, Hong Kong, Jiangyin, Nanjing, Wuhan and also in Kaohsiung (Taiwan). Shanghai is the location for the Country Office and the Area Office China, the Approval Services 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 for the 2005 to 2008 period (as per October 2005). The main focus lies on container ships, with 8,530 TEU units being built for China Shipping at the Hudong-Zhonghua 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 ongoing expansion of the repair yards guarantee rising demand for fleet services.

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Admiral Zheng He Conquers the Oceans

China is poised to become the world's leading shipbuilding nation – and it would not be the first time. In the 15th century, the Chinese fleet dominated the Pacific and Indian Oceans. The technology of the Emperor's ships surpassed that of all vessels sailing from the West.

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 were the nine-masters, 135 metres long and 55 metres wide, with a draught of over 8 metres. These were the "treasure ships", heavily laden with porcelain, silk and brocade as gifts for foreign rulers. Next to them, the eight-masted "horse ships" for the steeds of the cavalry, flanked by smaller and nimbler warships, patrol boats and water tankers. On the decks of this 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 caravels with which Christopher Columbus set out in 1492 could have fitted into one of the treasure ships six times over.

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 1405. 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.

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 farther, 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 construction 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. ■ NL

PHOTOS: LAIF (2), GERMANISCHER LLOYD (1)

Star of the Shipping Stage

Today, the China Shipping Group, established in 1997, is one of the ten largest ship operators worldwide. Its strongest division, and a rising star, is the subsidiary China Shipping Container Lines (CSCL).

Li Xue Qiang, Deputy Director of China Shipping Container Lines (CSCL), has set clear growth targets for the company

PHOTO: GERMANISCHER LLOYD

LI XUE QIANG does not match the picture many people have of Chinese managers. He is neither old nor stiffly formal, nor does he wear horn-rimmed glasses and a baggy uniform in the style of the seventies. Li Xue Qiang is in his mid-forties, tall and slim, and his suit fits perfectly. In a relaxed manner, he leans back in his chair and talks about the booming business. Almost incidentally, he mentions impressive success figures: "New ships ... greater capacity ... growth in volume ..." Li Xue Qiang is Deputy Director of China Shipping Container Lines (CSCL), one of the youngest shipping companies worldwide and the most successful newcomer by far. CSCL was founded in Shanghai in 1997, going public on the Hong Kong exchange in 2004. The shipping company is the "container branch" of the China Shipping Group, a state shipping company that is also fairly new, as it was also established in 1997. Under the umbrella of the China Shipping Group, there are five fleets – tankers, tramp ships, passenger ships, special cargo vessels and, of course, container carriers. In total, the Group manages 400 ships with a capacity of 11.5 million dwt, the container line making up the largest area of business. In 2004, the earnings of this subsidiary generated almost 50 per cent of the total overall result of 8.5 billion renminbi. For 2005, CSCL is projecting a profit of six billion renminbi. By way of comparison: when the company reported a profit for the first time with its jumbo carriers in 2002, the gain was just over 100 million renminbi.

AMONGST THE TOP THREE "By 2010, we want to be first or second in the world ranking as regards the capacity of our container line," is how Li Xue Qiang puts the targets for the container line. Ambitious plans that are by no means unlikely, because CSCL is already on the right course. And this will not only be true "because the two big players in the market – Maersk and P&O Nedlloyd – will soon count as one," Li Xue Qiang explains. Within the space of five years, the fleet capacity has more than tripled and the worldwide market share has risen from 1.7 to 3.5 per cent. According to statistics by BRS Alphaliner, the container line was still in 11th place of the world ranking in January 2005, with a capacity of 191,853 TEU. In May, it had already moved up to 8th place with 290,000 TEU. With the stowage place capacities, CSCL has now drawn even with China's shipping giant, COSCO.

No less than 128 CSCL container ships – only a little less than half are chartered – sail the seven seas, calling at ports on all the continents. At present, CSCL serves over 50 shipping routes in both national and international waters. The lines between China and Europe are of great importance, particularly the Mediterranean region. There the export business for CSCL doubled during 2004 in relation to the previous year, namely to 601,412 TEU. Although many containers returned to the home port empty, this situation is changing rapidly. The volume of goods imported from Europe to China increased by 72 per cent to almost 284,569 TEU. CSCL is therefore planning further routes from the Far East into the Mediterranean and to the Black Sea.

ALL QUITE SIMPLE "Anybody who has a ship today simply has to make a profit," says Li Xue Qiang. Shoes, trousers, hairclips – a large proportion of the commodities lying on the shelves of European supermarkets have one thing in common: they once were closely packed in transparent plastic bags in huge steel boxes. In some harbour on the Chinese coast, they were loaded onto a ship and, ten thousand or more sea miles later, arrived at their destination. "The development of the global economy is the foundation for the enduring triumph of our container ships," says Li Xue Qiang in an attempt to play down his own role a little. Success seems almost embarrassing for him.

But globalization cannot be the sole reason for CSCL's outstanding figures.

If this were the case, why have the traditional shipping companies not taken the trading volume? How could they have allowed a new company to muscle in on their business? An important advantage of CSCL is that the firm is still so young that it does not suffer from antiquated structures and can react with flexibility and speed. The motor of the entire success story is really Captain Li Kelin, President of the Group – of this CSCL's Deputy Director is quite convinced. "We also call Captain Li the founder of Chinese container shipping." Long before his countrymen and competitors, he had the right "nose" for the market of the future. "In 1997, Captain Li came from COSCO to China Shipping and immediately started to build up the fleet – against the prevailing trend. Back in those days, the prices were at rock-bottom. That was our head start."

Containerization has still not been exploited to the full. The market is open to further development; more ships are needed. The managers at China Shipping are certain of that. Leviathans of 10,000 TEU and more are already on the drawing board and planned for realization in five to ten years. At present, there are eight 9,600 TEU ships under construction. Until now, CSCL has primarily ordered its vessels from Korean yards. But that is all history now: the last big contracts were signed with partners only a few metres away from CSCL's front door.

"We have concluded a contract with the Hudong-Zhonghua yard in Shanghai for four container ships of 8,530 TEU and one option. And the option will almost certainly be built," Li Xue Qiang declares. These container ships will be the biggest ever constructed in China. The current record lies at 5,600 TEU – same yard, same shipowner. "China offers lower costs," says Li Xue Qiang. And the quality? He sees no problems there. "The Chinese yards have really become very good. And we are calling in experienced people to assist." This is another reason why CSCL, together with the yard, decided in favour of Germanischer Lloyd. However, the Hamburg classification society will not be the only one in the dock. The government in Beijing has issued the condition that all ships which are to sail under the Chinese flag must also be certified by the China Classification Society (CCS). So the 8,530 TEU ships will have dual class, with Germanischer Lloyd acting as the lead society.

"By 2010, we want to be first or second in the world ranking as regards the capacity of our container line."

HAMBURG AND THE CHINA SHIPPING GROUP China Shipping is not only linked to Germanischer Lloyd, but also to its home country. China Shipping first called at Hamburg with a container line service in 1999; today, there are six weekly departures (as per July 2005). The new 9,600 TEU ships are scheduled to begin sailing this route in summer 2007. In July 2005, Captain Li Kelin, President of the China Shipping Group, inaugurated the European head office of the Group on Sandtorkai in the new HafenCity area. He likes the Hanseatic city – despite or rather because of the weather: "In China, rain brings you luck and, above all, money." ■ NL

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 3 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, he is certainly not averse to progress. 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 will 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 365 metres in length and 82 metres in width. LPG tankers, LNG tankers, supertankers, 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.

MORE ON THE WAY Further docks will be built by 2015, increasing the shipbuilding capacity on the island to 8 million dwt. That is the state plan, but if you ask the people in the trade, the answer is always the same. The big decisions are taken at top level, within the China State Shipbuilding Corporation (CSSC) and the government. Nobody at the yards really knows who will get the orders.

For example, Shanghai Edward Shipbuilding is being considered. This Chinese-German joint venture – 45 per cent belongs to Hansa Treuhand, with the majority held by Hudong-Zhonghua Shipbuilding – is situated on the Expo grounds. It is possible that two major dockyards, Hudong-Zhonghua and Shanghai Waigaoqiao, will also build new production facilities on the island. However, they are not on the priority list at present. On the one hand, they are not in the way of the Expo; on the other, they are not affected by the bridge problem, because they are downstream of the bridges. Only the water depth will present a hurdle in the long term, but this limit has not yet been reached for container ships of around 8,000 TEU.

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.

One thing is for sure: in addition to the newbuilding yards, companies from other sectors of industry will also be moving to Changxing. Since the end of 2004, China Shipping Group has been operating a repair yard on the island. And 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 transport infrastructure. On one side, a tunnel will lead to the Shanghai district of Pudong, whilst a link will be created on the other side to the province of Jiangsu: a bridge will lead from Changxing Island to the adjacent and larger island of Chongming; from Chongming, another tunnel will provide access to the river bank. The connection via the neighbouring island of Chongming is in itself important, because ships are already being built there. In 2004, the Shanghai-Chenxi yard moved production from the Huangpu site to Chongming.

Chen Jin Hai, former director of Jiangnan Shipyard and now president of the strategy and steering committee (left) with Shen Xiao Dong, Station Manager Shanghai

ISLANDS NOT ONLY FOR SHIPYARDS The yards are taking over the islands, and the ports are following suit. On a pair of islands in the East China Sea off Shanghai, a new deep-sea harbour has been created – the port of Yangshan. At the first five berths, 2.2 to 3 million TEU can be handled per year. When the planned 52 berths are completed in 2020, this number will swell to 25 million TEU. A six-lane bridge 32.5 kilometres long connects the port to the mainland. The port of Yangshan is no status symbol – it was urgently needed. In 2004, the port of Shanghai had increased its container volume by almost 30 per cent to 14.55 million TEU, putting it in third place worldwide after Hong Kong and Singapore. The capacities of the terminals had exceeded their limits. And the new generations of post-Panmax ships could not be served at all by the old terminals. So, whichever way you look at it, the future of Shanghai shipping lies on its islands. ■ NL

PHOTOS: NORA LUTTMER

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 signs 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 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 0.58 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, tanks 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 30-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 with tank production, none were able to compete in the global market. The first tank manufacturers to offer serious competition to those in Europe were a number of companies which erected production lines in South Africa in the 1980s to enable the output of units built to European designs under licence. The advantages offered by South African tank container builders, in terms of the weakness of the local currency and the large number of professionals in the country anxious to invest in tanks to circumvent currency restrictions, ensured that South Africa emerged as the leading builder of tank containers in the 1990s. Unable to compete in the production of standard units, the European builders switched to the manufacture of relatively small numbers of special, high-value tank containers for dedicated and difficult-to-handle products – baffled and compartmented tanks, tanks in special alloys and units capable of carrying cooled and heated cargoes under carefully controlled conditions.

Today, the leading European manufacturers of special tank containers and swap tanks are Westerwälder Eisenwerke of Germany, Van Hool of Belgium, Universal Bulk Handling (International) Ltd of the UK and EbroTank of Spain.

CHINA TANKS UP China has emerged as a builder of tank containers through three companies – CIMC, already the world's largest producer of freight containers, Zhongshan Zhonghua Tank Containers (ZZTC) and Jiangsu Wanlong Special Containers (CXIC Wanlong) – only in the past few years. Yet CIMC has already overtaken Welfit Oddy, the last remaining South African builder, to become the leading tank container manufacturer in the world. CIMC and ZZTC are manufacturing tank containers under licence to designs originally developed in Europe. 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 tanks 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. ■ MC

PHOTO: INBULK TECHNOLOGIES

On the Way to a Certificate

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 from the national authorities. The intended purpose of a tank container may necessitate a dynamic impact test. For this, the flat railway wagon with the loaded prototype is subjected to a force corresponding to four times the maximum allowable gross weight of the container. Following the approval process and successful testing during production and before commissioning, 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. ■ MC

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REGULATIONS FOR TANK CONTAINERS

International recommendations/regulations, e.g.
- UN recommendations on the transport of dangerous goods (incl. multimodal portable tank provisions)
- International Maritime Dangerous Goods Code (IMDG Code)
- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)
- International Regulations concerning the Carriage of Dangerous Goods by Rail (RID)
- International Convention for Safe Containers (CSC)
- EC directives (e.g. 94/55/EC, 96/49/EC, 1999/36/EC, 97/23/EC)

National regulations/rules, e.g.
- (German) Gefahrgutverordnung See (GGVSee)
- (German) Gefahrgutverordnung Strasse/Schiene (GGVSE)
- Title 49 of the US Code of Federal Regulations (CFR 49)
- Canadian TDG regulations
- (German) Betriebssicherheitsverordnung (BetrSichV)

Technical regulations, standards, guidelines, e.g.
- ISO standards (e.g. ISO 1161, 1496-3, ISO 9367-1, ISO 668, ISO 6346)
- CEN standards (e.g. EN 1432, 12972, 14025)
- National standards (e.g. DIN, BS) including recognized pressure vessel codes (e.g. ASME Code, AD regulations [AD-Merkblätter])
- International Tank Container Organization (ITCO): Acceptable Container Condition (ACC)
- UIC Codex (e.g. 592-4)
- Association of American Railroads Specifications (AAR 600)
- (German) Technische Regeln Druckbehälter (TRB)
- Guidelines of classification societies

10,922 ships were inspected in Asian ports in 2004

PHOTOS: INBULK TECHNOLOGIES, GETTY IMAGES

Ship Inspections Have an Effect

18 countries in the Asian region have committed themselves to conducting systematic checks of ships in their ports. Last year, the contracting parties celebrated the tenth anniversary of the Tokyo Memorandum of Understanding on Port State Control. A review of the situation.

THE TOKYO MEMORANDUM of Understanding (MOU) is part of a network of agreements on port state controls 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 25 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 ISPS 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.

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). ■ CH

PORT STATE CONTROLS AND GERMANISCHER LLOYD

The society has achieved excellent results with regard to the Tokyo agreement. From 2002 to 2004, a detaining order was only issued in 3.8 per cent of all cases. So it comes as little surprise that Germanischer Lloyd again takes first place in an evaluation of all the mandatory ship inspections conducted in the past year on the basis of the Paris MOU. For Germanischer Lloyd, only 58 detentions were noted for a total of 11,773 surveys. This yields an excess factor of -1.41, which is the lowest value for the 25 societies considered.

Hull Strengthening Pays Off

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.

PHOTOS: GERMANISCHER LLOYD

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

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 ships' vulnerability. "Vessels with strengthened side 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 Mr Bruhns.

DAMAGE STABILITY CALCULATIONS Taking into account collision resistance was very time-consuming in the past. "An average of 16 different collision scenarios had to be calculated for both reference and new structural designs, each entailing thousands of arithmetical operations on the basis of the FEM," explains Dr Zhang. While the collision scenarios remain the same, the processing speed has been considerably improved through recent R&D results. "We were able to cut the working hours required for the calculations by 50%, which means reduced costs and shorter planning lead times for shipowners," adds Dr Zhang. Small double-hulled tonnage can still be built with a more favourable, geometric arrangement and thus increased loading flexibility. But their side structures will have to be strengthened in order to reach the equivalent damage stability requirement of SOLAS. "The steel weight will rise a little and the ships will require more work because we have to increase the collision resistance of double-hull structures," says Dr Zhang. The newbuilding price will therefore rise. "However, you must look at the whole life cycle of the vessel," points out Mr Bruhns. "The strengthened ships could be able to earn a premium on the charter market due to their improved loading capabilities, so they might yield an even better return for their owners than conventional ones." Some ships could even benefit from the Germanischer Lloyd procedure without incurring additional costs. Small ice-class dry cargo vessels, for instance, can already demonstrate higher collision resistance, so their cargo holds would not have to be further divided under SOLAS damage stability requirements. They can prove their survivability by using the society's new damage stability calculation. ■ MH

Hendrik Bruhns, stability expert

DISCOUNTS FOR PIONEERS!

Germanischer Lloyd will offer substantial discounts for the first few shipowners, shipyards or design offices who opt for its new procedure for leak stability calculation. Please get in touch with our Stability Department: Hendrik Bruhns, Phone +49 40 36149-635, hendrik.bruhns@gl-group.com

Harald Pauli of Germanischer Lloyd and Dr Anatoly Sagalevitch of the P.P. Shirshov Institute of Oceanology in Moscow getting the MIR ready for a test dive in the Baltic

PHOTOS: GERMANISCHER LLOYD

In the Wake of Jules Verne

Scientists, treasurehunters and the director of "Titanic", James Cameron, have all used the MIR to dive deeper into the ocean than is possible with normal submersibles. Harald Pauli of Germanischer Lloyd hit the panic switch of this Russian research submersible – and got away with it.

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 viewports 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

Heart of steel: the main sphere inside the MIR

respected expert for pressure chambers, Harald Pauli is simply predestined for tests of this nature, since the sphere in which the passengers are carried is effectively a pressure chamber. "The highlight of the MIR is really this sphere; it is the only pressure-proof part," Pauli explains. Attachments and ancillary components made of metal and plastic surround the sphere, but these are designed to flood when immersed. This and other features ensure adequate pressure compensation, so that atmospheric conditions prevail within the sphere, no matter how deep the boat dives. To put it another way, the attachments are in the high-pressure ocean and it is only inside the sphere – "the geometrically optimum shape for withstanding external pressures" (as Pauli points out) – that the passengers are able to breathe freely at a constant pressure of one bar. Even today, in the 21st century, the pioneering technology of the submersible's design engineers commands Harald Pauli's respect: "When you consider that the MIR was built all of 18 years ago, it's commendable that there is still nothing better to be had today." To provide some figures for comparison: in a car tire, the pressure is two bars, in a champagne bottle six, and a sport diver with a compressed air bottle is allowed to go down to 50 metres – since every ten metres of depth corresponds to one bar, the diver is then subjected to an additional pressure of five bars. In the pressure chamber at 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, "there is hardly any surface application requiring 750 bars, so analogies are hard to give. A cylinder of pressurized gas for welding, say, has about 200 bars."

WHEN INSPECTORS TAKE A DIVE 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 free itself easily when grounded 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 Mstislav Keldysv' 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, the work on a tourist submersible intended for 48 passengers is something completely different as regards fundamental design principles. In his office, he paces to a bookshelf and pulls out a thick volume: "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 submersibles. And some drop by to ask "Could you just check this for me?" These are usually tinkerers and inventors whose interest soon wanes when they hear that such an examination is associated with fees. So Harald Pauli advises all hobby submariners who want to experience first-hand what others only see on television to contact Viktor Nischtscheta, Eugeny Chernaiev or Dr Anatoly Sagalevitch. Chartering the MIR is an expensive affair, but the chances of finding a deep-sea treasure trove are much higher than with one's own craft, thanks to Viktor's experience and steady nerves. ■ CG

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Submarine Steel on Your Wrist

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.

UNDER WATER, TIME is of the essence. A diver uses his watch to monitor the length of his dive and the time left to surface. Watertightness, reliability and a robust casing are the decisive features for this working instrument. With a diving depth of as much as 2,000 m and a casing made of submarine steel from the U212, the special models U2 and U1 (to 1,000 m) made by the Frankfurt company Sinn Spezialuhren also satisfy the rigorous demands of extreme divers. These chronometers passed the Germanischer Lloyd test of toughness, were examined according to the Rules for submarines – and were found to be more than adequate. For acceptance of the "rated diving depth", the pressure test for submarines also prescribes a test with an additional increase in testing pressure. This procedure was also applied to the diver's watch. Can the casing, seals and glass of the U2 reliably withstand a pressure of 200 bar – corresponding to a diving depth of 2,000 m? To be on the safe side, it was then tested again at 250 bar.

HOW DO YOU SIMULATE A DEPTH OF 2,000 METRES? "We perform the test with an autoclave, a special cylindrical chamber for generating extreme pressures," explains Harald Pauli, Head of the Department for Pressure Vessels. Together with Dr Robert Surma, he put the diver's watches through their paces. "The container is filled with water, and then two complete U2 watches and a U2 casing are lowered into it." With a number 36 wrench, seven bolts are tightened fast – the container is tight and a pressure of 200 bar is built up. After enduring a whole hour, the watches and the casing have passed the pressure test: the U2 is a reliable instrument, even at 2,000 metres below the waves.

However, no human will be able to reach such depths without protection: professional divers can go down to about 300 m, but only 150 metres are possible without diving apparatus. At this depth, one's lungs are about 16 times smaller than at the water surface. On every square centimetre of your body, the pressure is a crushing 16 kilograms. But for the U2 by Sinn, more than 200 kilograms per square centimetre present no problem at all. A decisive role is played here by the special seals, the domed 4.22 mm sapphire glass and the 4 mm thick base of antimagnetic submarine steel. The additional test then follows with 250 bar applied to the watch casing. Here too, the test was passed with flying colours. Because of the certification by Germanischer Lloyd, every owner receives a watch that truly offers superhuman reliability. ■ HB

Certified by Germanischer Lloyd: the U2 (top), made of submarine steel, is available now. Below: Part 1 of the test, in which the watches are lowered into the special pressure-testing chamber

PHOTOS: GERMANISCHER LLOYD, SINN SPEZIALUHREN (2)

For further information: Harald Pauli, Head of the Department for Pressure Vessels and Underwater Technology, Phone +49 40 36149-365, harald.pauli@gl-group.com and for information on Sinn Spezialuhren, visit www.sinn.de

News from Industrial Services

Retiree Dr Bernhard Richter (centre), together with Dr Hans Berg (left) and Lutz Wittenberg, the Managing Directors of Germanischer Lloyd Industrial Services

Personnel News: A Pioneer Leaves the Field

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 GROWIAN 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 Wind: 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 GmbH 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 operating area "Industrial Services" with operational responsibility for oil and gas, certification, wind energy, testing laboratories and civil engineering/fire protection. Only a few months later, he was named Director. "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 of Germanischer Lloyd, described Bernhard Richter at the official farewell ceremony.

Joachim Lau, CEO of ASKON, and Wilfred Schansker, Head of Quality Management Systems at Rheinmetall Defence Electronics, are handed over certificates by Rainer Schöndube

PHOTOS: MICHAEL BOGUMIL

AIRCRAFT INDUSTRY

Certification of First Suppliers

Germanischer Lloyd Certification GmbH (GLC) has been recognized for the certification of aerospace supply companies by the German Association for Accreditation (TGA). In this field, GLC applies the DIN EN 9100 standard, an advancement of ISO 9100 containing additional requirements of the international aircraft industry. The first customers – both suppliers to the European aircraft manufacturer Airbus – are ASKON Beratungs GmbH and Rheinmetall Defence Electronics GmbH. Inclusion in the Online Aerospace Supplier Information System is a prerequisite to being chosen as a vendor by manufacturers in the aerospace industry, and only suppliers with certification are considered for the OASIS database. For further information: Bernhard Ständer, Managing Director of Germanischer Lloyd Certification GmbH (GLC), Phone +49 40 36149-124, bernhard.staender@gl-group.com

VDI CONFERENCE

Production-Related Damage

Great progress has undoubtedly been made in the field of product quality for technical goods over the past decades. For example, the spark ignition engines in today's cars achieve a mileage that, 30 years ago, would only have been possible for truck diesel engines. And yet system or component failure has not been banished entirely from modern technology. "Production-Related Damage – Despite Quality Management?" was the title of the 31st VDI Annual Conference on Failure Analysis, which took place this year on 19 and 20 September in Würzburg. 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". 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 +49 208 58982-13, feyer@glplabor.de and Bernhard Ständer, Managing Director of Germanischer Lloyd Certification GmbH, Phone +49 40 36149-124, bernhard.staender@gl-group.com

EXPANSION

WINDTEST Needs More Space

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. And there was every reason to celebrate, as Managing Director Volker Köhne explained to his guests: the third extension is a clear indication of healthy and sustained growth and shows how the demand for engineering services has increased. Over the past five years, WTK has tripled its turnover. The workforce of skilled experts, now almost fifty in number, is concerned with all aspects of the measurement and expert appraisal of wind turbines. For further information: Volker Koehne, Managing Director WTK, Phone +49 4856 901-22, koe@windtest.de

Trade Fairs

FEBRUARY/MARCH
27.02–02.03.2006, Athens, Greece
European Wind Energy Conference
www.ewec.info

INSPECTION OF PRESSURE EQUIPMENT

Beijing Forum Discusses Convergence

At the two-day "International Forum on Special Equipment Safety" in Beijing, which was attended by 500 representatives of industry, testing organizations and state supervisory authorities, Germanischer Lloyd was represented by the expert Thomas Woehler from the NCP department. The term "special equipment" covers all installations and appliances requiring constant monitoring, such as pressure equipment, pressure vessels, steam boilers, pipelines, and valves, and also lifts, cable cars and temporary structures, as may be found in amusement parks. After the forum, discussions between EU representatives and Chinese officials centred on the mutual recognition and harmonization of regulations and provisions for pressure equipment. The EU deputation included Thomas Woehler, who is one of the three German delegates for pressure equipment to the European capital, Brussels. Since 1999, Germanischer Lloyd AG has been listed in Brussels as notified body no. 0098 for pressure equipment. The various technical departments are also concerned with the conformity assessment of personal protective equipment, recreational craft and the noise emissions of machinery. For further information: Harald Pauli, Head of the Department for Pressure Vessels/ Underwater Technology, Phone +49 40 36149-365, harald.pauli@gl-group.com

Standards Jump-Start the Global Economy

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.

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 drabness. 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

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

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

PHOTOS: GERMANISCHER LLOYD

Left: The service spectrum of Germanischer Lloyd Oil and Gas (GLO), both in China and worldwide, includes the inspection of refineries like this one. Top right: The Managing Directors of GLO, Hartwig Schönbach (left), and GLC, Bernhard Ständer (right). Bottom right: A successful inspection by GLO is confirmed with this stamp

offer its services to an increasing degree. The spectrum of services ranges from the inspection and certification of designs, materials, components and installations right up to the commissioning of entire plants. Of course, the experts also attend to the operational processes of the corresponding plants later on. What does a service package like this look like? Imagine the construction of a pipeline for the transportation of natural gas. First of all, the planned route must be examined to see whether it can be used at all from both a technical and a commercial viewpoint. This includes a study on the environmental impact of the construction project.
Do the design, materials and components meet the specified technical standard? Checks and independent calculations detect shortcomings in the design at an early stage; after the corresponding corrections, the standards are met and the design can be certified by GLO.

What measures secure the proper construction and subsequent operational reliability of the pipeline? During construction surveillance by Germanischer Lloyd Industrial Services, steps are taken to ensure that all pipes have been welded together properly with the calculated wall thickness and laid in the correct order along the route. However, Hartwig Schönbach sees the greatest opportunities for GLO as lying not in the services for recovery of the raw materials but above all in the transportation and processing of imported hydrocarbons, with LNG imports being of special interest. "These are key factors for the security of the energy supply," he says. And this is of extreme importance for Chinese industry, especially if foreign investors are to be called into the country. No plant operator will accept the threat of frequent interruptions in supply, since this would cast serious doubts on the locational advantage. For the time being, GLO is concentrating its work on the Shanghai area and the Pearl River Delta region. These are the centres of the Chinese oil and gas industry. At the same time, this is where the main consumers of the energy resources are to be found.

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 here. 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." Apart from the ISO 9001 certification, GLC also offers a relatively new instrument which may be of interest for the Chinese market: the Cool Chain Quality Indicators (CCQIs). This is a new industry standard developed by Germanischer Lloyd in cooperation with the Cool Chain Association (CCA). 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.

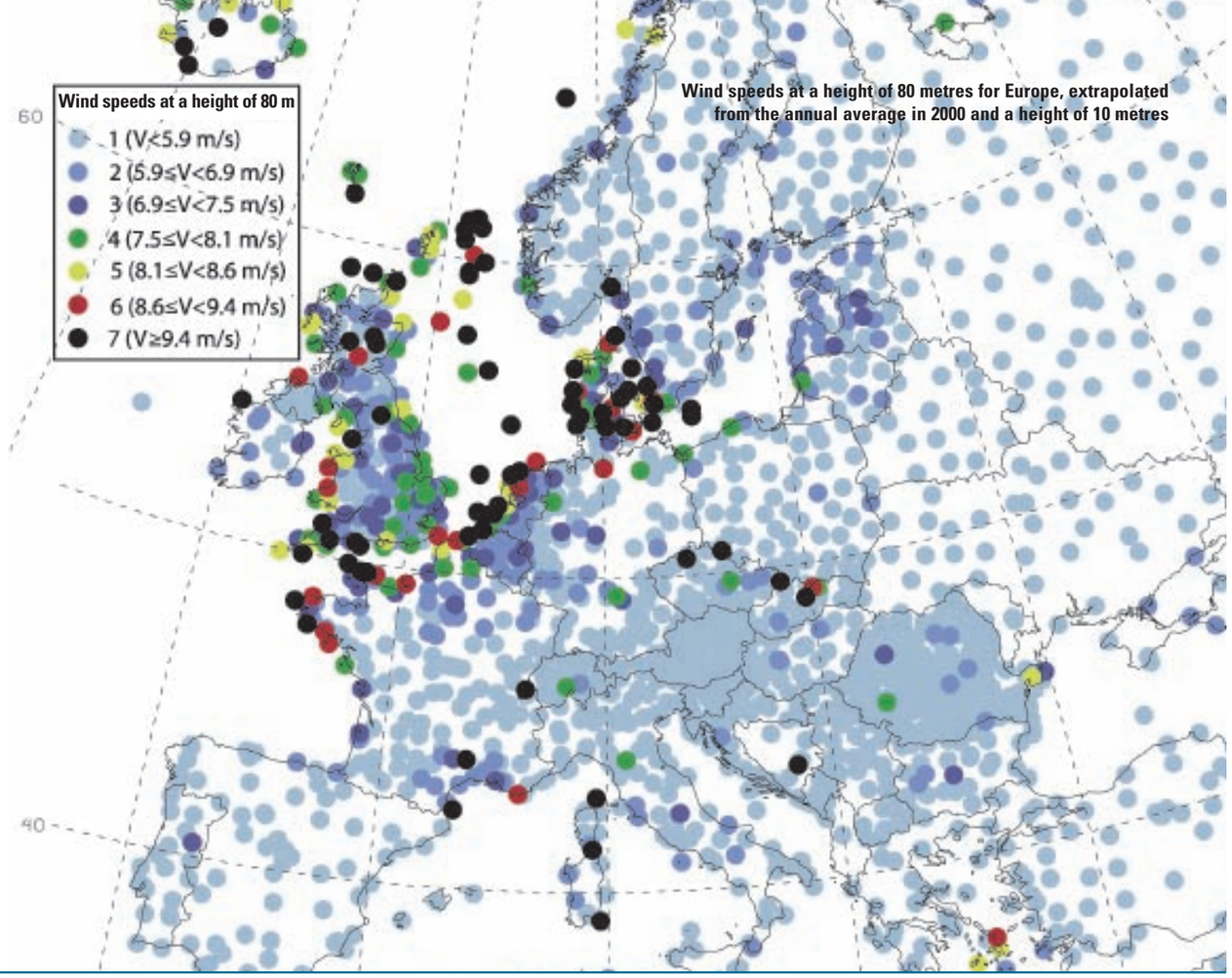
THE MARKET IS THE LAW Standards are not laws. The International Organization for Standardization (ISO) in Geneva, which has many thousands of international standards stored in its database, is not a statutory authority. Compliance with these standards is voluntary. But whoever wishes to succeed in the 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 particularly strict, then it is only what the purchasers want. 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. ■ NL

For further information: Hartwig Schönbach, Managing Director of GLO, Phone +49 40 36149-515, hartwig.schoenbach@gl-group.com; Bernhard Ständer, Managing Director of GLC, Phone +49 40 36149-124, bernhard.staender@gl-group.com

GLO also provides technical support and surveillance for the construction of pipelines

PHOTOS: MICHAEL BOGUMIL (2), GERMANISCHER LLOYD (3)



Wind speeds at a height of 80 metres for Europe, extrapolated from the annual average in 2000 and a height of 10 metres

SOURCE: ARCHER, C. L., AND M. Z. JACOBSON (2005), EVALUATION OF GLOBAL WIND POWER, J. GEOPHYS. RES., 110, D12110, DOI:10.1029/2004JD005462. COPYRIGHT 2005 BY THE AMERICAN GEOPHYSICAL UNION.

European Map of Wind Energy

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.

„nonstop": If wind energy could be harvested more effectively, it would even be possible to satisfy the entire world demand for electrical power – this is the essence of your study. Is this not a rather daring proposition?

ARCHER: By no means. In fact, you don't really have to make a great effort to find suitable sites around the globe that are very well suited for wind turbines – like the North Sea in Europe, for example.

For your study, you evaluated wind conditions at about 8,000 locations around the world. Where did you get the exact data?

The data is made accessible to the general public by a governmental body, the National Climatic Data Center (NCDC). The sources are 500 measurement balloons and 7,500 ground stations logging the wind at an altitude of ten metres.

But you developed a mathematical methodology to extrapolate these figures to a height of 80 metres?

Yes, it is called the "least square extrapolation technique" and gives us very exact forecasts on how the wind will behave at a height of 80 metres above ground level. We found out that, at 13 per cent of these 8,000 locations, the average annual wind strength is at least 6.9 metres per second. 13 per cent is really a very high proportion – much higher than previously thought. And there are even regions, as is the case in the USA, in which this figure increases to 20 per cent.

And where are these international hot spots of wind energy potential?

Practically everywhere around the world. Not only are there very strong winds in Northern Europe, you will also find strong gusts off the southern tip of South America and around the Australian island of Tasmania. In North America, we have very stormy regions along the south, west and east coasts and also in the interior of the country, around the Great Lakes.

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 analysed 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.

Cristina L. Archer, author of the study

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.

FURTHER INFORMATION ON THIS TOPIC

The article "Evaluation of Global Wind Power" by Cristina Lozej Archer and Mark Z. Jacobson appeared in the May issue of the highly respected Journal of Geophysical Research – Atmospheres, a publication of the American Geophysical Union.

Cristina Lozej Archer is Consulting Assistant Professor in the Department of Civil and Environmental Engineering at Stanford University, and can be contacted at www.stanford.edu/~lozej.

Mark Z. Jacobson's website is www.stanford.edu/group/efmh/jacobson.

Further information and studies are available at www.stanford.edu/group/efmh/winds and at www.stanford.edu/group/efmh/winds/global_winds.html.

Erich Nitzsche (left), Head of Quality Management at Jungheinrich, and his auditor, Jens Rogge of Germanischer Lloyd Certification GmbH

Dream Team for Manufacturing Logistics

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 stretches 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 situation 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 development." 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 quality 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 service and the sales-related services make an important contribution. 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 represents an advantage for the Jungheinrich rental fleet, which is unique throughout Europe with 16,500 vehicles in 40 versions and an average age of only 1.5 years. All through the service business, which also includes the planning of complete warehouses with materials handling technology and control units, the full-service concept is increasingly becoming 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 "suboptimizing". At the same time, an efficient steering tool is created. 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 elbow room. New process standards are not simply prescribed. "The path to the desired result is always one we walk together. The first step may then take a bit longer – but later implementation is all the faster. In this way, some highly efficient standards have been crafted."

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 performance then characterizes the roles perceived by the players. The Jungheinrich quality manager sees himself primarily as a facilitator and internal adviser. "Exactly how the various 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 during 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 environmental 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. ■ AS

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Erich Nitzsche: Certification strengthens brand confidence

PHOTOS: MICHAEL BOGUMIL

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 were 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. A 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, furled, 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, with his comrades joining in with the refrain and the sudden tugging or hauling. 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 ..." Seafarers 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 rhythm 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 rousing account of their tavern experiences in the last port or about the everyday drudgery on board. Such a shanty was improvised 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 stinginess and bandy 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-sodden yachting crews. You may recognize this classic – it begins with the Low German words "Ick heww mol nen Hamborger Veermaster seen ..." (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

PHOTO: STEPHANIE BRINKKOETTER

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