

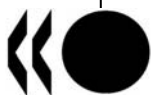
COUNCIL
WORKING PARTY ON SHIPBUILDING

THE SHIPBUILDING INDUSTRY IN CHINA

This report on the shipbuilding industry in China is submitted for consideration by the WP6 at its meeting on 3-4 July 2008.

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JT03248360



Summary

This report on the shipbuilding industry in China is one in a series of such reports intended to provide an insight into the shipbuilding sectors of both OECD members and non-OECD economies.

The report has benefited from detailed comments provided by the China Shipbuilding Economy Research Center, whom we thank for their participation. It also remains open for Chinese authorities to provide additional comments, which would be taken into account in a possible future revision of this report.

Action

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THE SHIPBUILDING INDUSTRY IN CHINA

INTRODUCTION

1. When vessels were built of wood, the easy availability of this material made the United States the first major player in shipbuilding in the early part of the 19th century. However, as wood was replaced by iron and steel in the 1850's, Britain took over the leadership, and it remained the leading shipbuilder until 1956, when it lost its leading position after being overtaken by Japan. During the recession of the 1980s, all shipbuilding regions worldwide experienced significant falls in orders, a trend that was exacerbated by the subsequent oil crises. About half of the shipyards worldwide disappeared from the map during this period, and employment in the industry was effectively halved. While there was a strong recovery in the 1990's, the European yards were not able to fully benefit, and yards in the Far East achieved the dominance that they still enjoy today.

2. The present development of the Chinese shipbuilding industry follows a similar pattern to what had happened earlier in Japan and Korea. Japan used its shipbuilding industry in the 1950s and 1960s to rebuild its industrial capability, while Korea saw shipbuilding as a strategic core for its economic development in the 1970s (Thorsten Ludwig, Jochen Tholen, 2006). China is now also taking that development path by taking full advantage of the demand shift towards centres of low cost production, and making full use of its low cost advantage and large domestic demand to build a solid industrial foundation..

3. China has experienced a period of growing prosperity and stability since the introduction by the Chinese Government of the Open Door Policy in 1978. This was a comprehensive program of economic reforms, modernisation and social development, and China has now emerged as a significant global economic power. Its shipbuilding industry has grown significantly and is now placed second or third in the world market behind Korean and Japan.¹ Substantial new shipyards are being built and a massive investment in research and development is leading to an increasing sophistication in the types of ships being built.

Snapshot of Chinese shipbuilding industry development

4. The development of the Chinese shipbuilding industry is often compared to the development of the industry in South Korea, but the conditions for the process of development differed considerably. While, the South Korean shipbuilding industry was aimed from the outset at producing vessels for export, in contrast the economic strategy in China has initially been to develop shipyard capacity to sustain domestic economic development. In other words, the substantial construction of shipbuilding capacity in China has primarily been aimed at enabling China to be self-sufficient in sea transport. Above all, from the Chinese perspective, the supply of raw materials for domestic manufacturing, meeting the food needs of its populations and the transport of exports should to the extent possible be undertaken by Chinese built

¹ According to statistics released by the Commission of Science Technology and Industry for National Defence(COSTIND), the yearly output of Chinese shipbuilding industry in 2006 reached 14.52 million dwt, ranking the third place in the world. COSTIND's statistics of August of 2007 also showed that in terms of new orders (42.62 million dwt) and orderbook (105 million dwt), China was ranked in the second place in the global shipbuilding market.

ships. However, China has for some decades actively explored the international market, and the trend in the mix of vessels being constructed indicates that the share of that market captured by Chinese shipbuilders is continuously increasing.

5. In terms of yearly output, in 2007 China maintained its position as the world's third-biggest shipbuilder, a rank it has held for over a decade. Overall, Chinese shipbuilders produced 10.4 million gt of new vessels in 2006, or around 18.4% of the world's total, compared to 4.7% in 2000. By comparison, in 2007 Korea produced 35.7% and Japan 30.6% of the world total (on a gt basis) - (Lloyd's Register – Fairplay, 2007, and Lloyd's Register, 2000). In 2006, the top two shipbuilding conglomerates, the China Shipbuilding Industry Corporation (CSIC) and the China State Shipbuilding Corporation (CSSC), reported a yearly output of 6.02 million dwt and 2.67 million dwt respectively (COSTIND, 2007)².

6. Figures as of September 2007, compiled by World Yards database, showed that the top ten Chinese shipbuilders accounted for around 12.7% of the global shipbuilding market. Dalian Shipbuilding Industry (CSIC) and Shanghai Waigaoqiao Shipbuilding (CSSC) became world top 10 shipbuilders³, joining a list that before had been the sole domain of Japanese and South Korean companies (World Yards Report, 2007). The types of ships made in China have also diversified from conventional bulk carriers and crude oil tankers to high value and sophisticated vessels, such as very large crude carriers (VLCCs), liquefied natural gas carriers and high-speed container ships (COSTIND, 2007).

7. With respect to new orders, Chinese shipbuilders reported new orders totalling 58.0 million gt in 2007, to bring the total ship orderbook to 97.8 million gt, which represented 29.7% of the global share (Lloyd's Register – Fairplay Dec 2007). In accordance with its national shipbuilding blueprint, China expects to be the world's biggest shipbuilder by 2015.

Geographic distribution of principal construction facilities

8. There is no reliable, publicly available information about the number of the Chinese Shipyards, but this is estimated to be more than 2 000 (COSTIND, 2007). According to the 2007 yearbook of the shipbuilding industry of China, there were around 430 significant shipbuilding enterprises in 2006, which include all state-owned shipyards and those private shipyards whose sales revenue is larger than 5 million yuan⁴. A detailed list of China's major shipbuilding and repair yards is at Annex I.

9. China has a long coastline, as well as many rivers. Its mainland is edged by the Bohai Gulf, the Yellow Sea, and the East China and South China seas. The Chinese shipbuilding and ship-repair industry comprises a large number of yards ranging from those capable of building VLCCs through to the numerous very small yards generally building small boats and local craft. These yards cover a wide geographical area, both coastal and inland, reflecting the development of marine industries along the major river systems.

10. However, widespread shipbuilding and repair activity tends to be concentrated in specific locations. The most significant of these are Shanghai, followed by Guangzhou and Dalian. Shipbuilding facilities have also particularly focused at the mouths of China's two main rivers – the Yangtze and Pearl, with some inland development along these waterways. Some limited development is also to be seen on the eastern coastline between these two main rivers. In Northern China, shipbuilding has tended to concentrate in the coastal areas bordering the Bohai Gulf and the mouth of the Yellow River.

² For information on recent changes to COSTIND please see paragraph 26.

³ As of September 2007, the production outputs of Dalian Shipbuilding and Shanghai Waigaoqiao were 3.32 million CGT and 2.28 million CGT, respectively.

⁴ The cited information was provided by the China Shipbuilding Economy Research Center.

11. China's largest shipbuilding cluster is located in the Yangtze River Delta region. The Yangtze River, the longest river in China, rises in the far West and ends at Shanghai, where it exits into the East China Sea. The main shipyards, mostly belonging to the CSSC, located in the region of the Yangtze River Delta are listed in Table 1.

Table 1. Main Shipyards in the Yangtze River Area

Name of Shipyard	Province	Company	Build/Repair
Waigaoqiao	Shanghai	CSSC	B
Hudong-Zhonghua	Shanghai	CSSC	B
Chengxi Shipyard	Jiangsu	CSSC	B/R
Shanghai Shipyard	Shanghai	CSSC	B/R
Jiangnan Changxing	Shanghai	CSSC	B
Huarun-Dadong Shipyard	Shanghai	CSSC	R
NACKS	Jiangsu	JV COSCO&KHI	B
New Century	Jiangsu	Private Enterprise	B
Yangzijiang	Jiangsu	Yangzijiang Shipbuilding (Holding)	B
New Yangzi	Jiangsu	Yangzijiang Shipbuilding (Holding)	B
Dayang	Jiangsu	Evgreen Group	B
LiXin Shipyard	Shanghai	CIC	R
Kouan Shipyard	Jiangsu	China Commerce	B/R
Jinling Shipyard	Jiangsu	CNSC	B
Wuhu Shipyard	Anhui	CSSC	B
Jiangdong	Jiangsu	CNSC	B
Yicang Shipyard	Hubei	CNSC	B
Qingshan	Hubei	CNSC	B

Source: China Shipbuilding Economy Research Center

12. China also has an extensive coastline along its eastern and southern extremities. Being very close to dense shipping routes, and with numerous sea and river ports along the coast, these have brought trade to the region for centuries. Encompassing the areas to the south of Shanghai down to the Pearl River, the region includes Zhejiang, Fujian, Hainan provinces and Hong Kong. The main shipyards in the region are shown in Table 2.

Table 2. Main Shipyards of the East and South China Coasts

Name of Shipyard	Province	Company	Build/Repair
Zhejiang Shipyard	Zhejiang	Evgreen Group	B
Zhoushan wuzhou	Zhejiang	Zhejiang Shipping	B/R
Hongguan	Zhejiang	Municipality	B/R
Haifeng	Zhejiang	Municipality	B/R
Jianghai	Zhejiang	Municipality	B
Cosco-shipyard (Zhoushan)	Zhejiang	Cosco-shipyard	B/R
Xiamen	Fujian	Fujian SIGC	B
Mawei	Fujian	Fujian SIGC	B/R
Yangfan	Zhejiang	Jianlong Steel	B/R

Source: China Shipbuilding Economy Research Center

13. The Pearl River is the largest river in South China. Like the Yangtze, the Pearl River has fostered a number of shipbuilding facilities near its mouth, primarily around the Guangdong, Guangxi, Guizhou and Yunnan provinces. Table 3 identifies the main shipyards of the regions along the Pearl River.

Table 3. Main Shipyards of the Pearl River Area

Name of Shipyard	Province	Company	Build/Repair
Guangzhou International	Guangdong	CSSC	B
Wenchong	Guangdong	CSSC	B
Wenchong-Yuanhang	Guangdong	CSSC	R
Cosco-shipyard (Guangzhou)	Guangdong	Cosco-shipyard	B/R
Yiu Lian - Shekou	Guangdong	Yiu Lian	R
BoLuoMiao Shipyard	Guangdong	CIC	R

Source: China Shipbuilding Economy Research Center

14. Another cluster of shipbuilding facilities is located in the area extending from the Yellow River (China's second longest river) to the Heilong River in northern China, which forms most of the north-eastern boundary with Russia. Primary shipyards in the region are listed in Table 4.

Table 4. Main Shipyards of the Yellow River, Heilong River and North China Coast Area

Name of Shipyard	Province	Company	Build/Repair
Dalian	Liaoning	CSIC	B
Bohai	Liaoning	CSIC	B/R
Qingdao Beihai	Shandong	CSIC	B/R
Shanhaiguan	Hebei	CSIC	B/R
Xingang Shipyard	Tianjin	CSIC	B/R
CSG -Dalian	Liaoning	CSG	B/R
Cosco-shipyard (Dalian)	Liaoning	Cosco-shipyard	B/R
Yantai Raffles	Shandong	Yantai Raffles& JV	B
Weihai	Shandong	Province	B
Huanghai	Shandong	Province	B
Qingdao-Hyundai	Shandong	JV	B

Source: China Shipbuilding Economy Research Center

15. The China State Shipbuilding Corporation (CSSC) owns shipyards principally around the Yangtze River around Shanghai, including the Guangzhou, Chengxi, Wuhu, Jiangnan, Hudong, Hudong-Zhonghua and Qiuxin shipyards. The China Shipbuilding Industry Corporation (CSIC) is principally located around the Gulf of Bo-hai (Dalian), consisting of the Bohai, Dalian, Dalian New and Wuchang shipyards. The main independent yards comprise the Xingang, Weihai, Jiangdu, Nantong, Jinling, Jiangdong, Shanghai Edward, Waigaogiao Mawei, Xiamen, Guang. Wenchong, Zhejiang, Qingshan, Kouan, Jiangsu and New Century shipyards.

ROLE OF SHIPBUILDING IN THE CHINESE ECONOMY

16. Since 1980 China has experienced considerable economic growth, with the gross domestic product (GDP) growing at an annual average of 9.7% from 1978 to 2006 and at 11.4% in 2007. China's accession to the World Trade Organization (WTO) in 2001 has been crucial in promoting China's

integration into the global trade system, which has helped it to sustain economic growth, increase domestic purchasing power and become the world's leading exporter.

17. The Chinese shipbuilding industry experienced considerable expansion virtually in parallel with China's accelerated economic growth. This economic development, driven by exports, has relied heavily on seaborne transport services, but unlike other emerging economies which relied heavily on foreign shipping services, China adopted a policy of building up its domestic fleet to meet the growing demands of international trade, and this greatly increased the commercial output of new vessels. While Chinese shipyards delivered only 0.9% of all vessels in 1985, that proportion had increased to 4.7% in 2000 (on a dwt basis). During the period between year 2000 and 2005, the yearly output of Chinese shipbuilding industry outperformed the EU-25, and firmly entrenched its position as one of the top three players in the global market. (Thorsten Ludwig, Jochen Tholen, 2006).

18. The statistics compiled by Commission of Science Technology and Industry for National Defence (COSTIND) show that in 2005 there were more than 2000 shipbuilding companies in China, which employed a workforce of around 400 000, of which 315 000 were employed by the 480 largest companies (船舶管理辦公室, Ship Management Office, COSTIND, 2005).

Status as a strategic industry

19. The shipbuilding industry is technology, labour and capital intensive. In China it is also a strategic industry, intended to upgrade its national defence capability, drive economic development and serve as a catalyst for the development of the iron and steel, electronic, and machinery manufacturing industries. In 2006 the Chinese government unveiled an official shipbuilding blueprint to guide the medium and long-term development the shipbuilding industry. This National Medium-and Long-term Plan focus on systematic planning to identify and remove barriers to industrial development. The Plan urges the Chinese industry to increase its efforts over the next five to ten years in order to challenge existing mainstream shipbuilders.

20. China is particularly well positioned to develop this industry compared to most economies, as it has a number of significant advantages with respect to the primary inputs into this industry sector. These include the availability of land, a large, well-trained and relatively cheap labour force and complementary industrial support from other sectors such as the iron and steel, metallurgical and machinery manufacturing industries. The shipbuilding sector also has access to capital investment to strengthen and upgrade technical and technological capability, which has enhanced its design and construction capability to allow the competitive construction of VLCCs, environment friendly bulk carriers and technically advanced container ships. China is now also capable of constructing sophisticated, large scale LNG carriers.

Relationship with other industry sectors

21. In pursuit of China's stated aim of becoming a major shipbuilder, COSTIND has identified the marine equipment industry as a key element in the supporting industrial infrastructure, and has accorded it a very high priority. For example, marine electronics, as a by-product of developments in the shipbuilding and information industries, is emerging as a new growth area in the national economy. The 11th National 5 Year Economic Plan (2006-2010), provides for China to increase its local supply capability and the technological level of marine equipment, in order to optimise the industrial chain supporting the shipbuilding sector⁵.

⁵ Comments made by Hu Yafeng, Deputy Secretary General of COSTIND, at the China (Wuhan) International Marine Equipment Industry Development Forum, 23 September 2007, Wuhan.

22. In many developed economies, shipbuilding is frequently closely related to the iron & steel industries. For instance, America's General Dynamics Marine Systems covers the two industries. The Korean steelmaker POSCO invested in the Korean Daewoo shipyards to ensure a closer integration of those activities, and Japan's JFE Steel Corporation has also acquired a world-class shipbuilding enterprise. The recent increases in the price of steel has increased the cost of shipbuilding, and as a result some shipyards have found it difficult to generate profit from orders based on contracts signed before the steel price rose. From the perspective of steelmakers, the integration with shipbuilding enterprises would provide a steady and relatively predictable demand for their products. In China, many iron and steel enterprises have expressed their willingness to build up manufacturing, processing and distribution centres with shipbuilding enterprises in order to improve production efficiency and decrease production costs.

POLICIES OF THE CHINESE GOVERNMENT

23. Governments at different stages of economic development view shipbuilding as a strategic industry, which not only creates economic benefits but it also helps deliver public policy outcomes. The impacts of industrial development could include generating employment, accelerating regional development, increasing industrial and defence capacity, and strengthening technological capability. It can also act as a catalyst to attract direct and indirect foreign investment (OECD, 2007).

24. The rapid growth of Chinese shipbuilding is also closely linked to the government's macroeconomic policies. Through its 'five years plans', the Chinese government frames its guidelines for the development of different sectors to ensure their long term sustainability and competitiveness. The 11th National 5-year Economic Plan was the first to specifically mention the maritime sector.

25. As part of this plan, the National Development and Reform Commission (NDRC) and the Commission of Science, Technology and Industry for National Defence (COSTIND) have formulated a mid-to-long-term programme for the development of the shipbuilding industry, which was approved by the State Council. The key targets set by the Plan include encouraging foreign investment and Sino-foreign joint ventures, opening the sector for public investment, increasing annual output to 17 million dwt by 2010, increasing the output of locally produced ship equipment by more than 60% by 2010, speeding up the construction of key shipbuilding facilities⁶ and increasing annual production capacity of medium and low speed ship diesel engines to reach 4. Million kw and 1 100 units respectively.

Role of government

26. The NDRC generally takes charge of China's industrial planning. For its part, the COSTIND⁷, situated under the State Council, is responsible for introducing policies, implementing industrial development, enacting laws, regulations and standards, supervising enterprise operations and providing coordination and services among defence related industries. While the COSTIND does not become involved in the general business operations of individual companies, in order to create a workable business environment it does undertake a number of measures to prevent over-investment, and follows normal market mechanisms to keep the market in order.

⁶ Such facilities include those in Bohai Sea in the north, the outlet of the Yangtze River near Shanghai and the outlet of the Pearl River near Guangzhou in the south.

⁷ According to an official statement released by the Chinese government, the 11th National People's Congress, held in March 2008, decided that in order to reduce the size of the central government to 27 ministries and councils. COSTIND and other three Ministries would be integrated into a new Ministry of Information Industry (MII). Two new agencies were created under the MII, of which the Bureau of National Defence Industry is expected to take the responsibility for China's shipbuilding industry.

27. The Ship Management Office, an independent unit under the COSTIND (before the recent decision on Chinese government's restructuring projects made at the 11th National People's Congress), is responsible for the formulation of industrial and technological policies and plans for military and commercial ships. The Office, collaborating with 26 province level offices, compiles statistics, releases annual reports and calculates the production output and manufacturing capacity of shipbuilding industry.

28. In accordance with the 11th national 5-year Economic Plan, the COSTIND is implementing plans to strengthen and upgrade the overall shipbuilding industrial capability through the construction of three major modern shipyards. It is also upgrading existing shipbuilding facilities, encouraging industrial consolidation and promoting new private or joint-venture shipyards. The Plan also focuses on the requirement for advances in new ship design, and investment in quality management, resource and supply structures.

29. According to the China Shipbuilding Economy Research Center,⁸ in order to regulate the development of the Chinese shipbuilding industry, the Chinese government is formulating Provisions on the Administration of Shipbuilding License. The major goal of these provisions is to establish a market access system for shipbuilding, clarify legal conditions and standards, prevent unqualified and incapable enterprises from entering the shipbuilding market, enhance macro-control over the development of the shipbuilding industry, promote the overall level of the shipbuilding industry, control the hidden accidents of ships from their origin and ensure the transportation safety of ships and the safety of the lives and properties of people.

Support given to industry

30. The Chinese government generally supports shipbuilding industry by exempting it from tariffs applicable to imports for key components necessary for the production of some kinds of high-tech ships, and by providing incentives for investment in R&D and innovation. The tariff policy is also closely related to the Chinese Government's endeavours to balance foreign exchange income and expenditure.⁹ The principal measures, aimed at increasing competitiveness in the industry, include promoting industrial consolidation and reconstruction, establishing international R&D and technical cooperation, improving management skills and risk control, and providing financing assistance.

31. The Chinese government contributed to a survey conducted by the Council Working Party on Shipbuilding survey in late 2007 to construct an Inventory of subsidies and other support measures provided to the shipbuilding industry. The response by China indicated that, in general, the Chinese government supports include export credits, support for research and development and protection of the domestic market. The Export-Import Bank of China is responsible for providing export credits to borrowers of up to 80% of the value of commercial contracts. The maximum maturity period is 15 years and the interest rate can either be fixed or floating, plus an unspecified interest rate spread.

32. In its support for research and development to industries, the COSTIND has since 2001 selected basic, general-purpose and frontier technologies as major targets. Between 2004 and 2006, the research and development supports amounted 10 million yuan, or around USD 1.21 million. In the protection of the domestic market, the State Oceanic Administration purchases domestically built ships when these are cost-effective. A further protection to the domestic market is provided through the application of tariffs on imported ships by the Ministry of Finance. These tariffs, which are in accordance with the commitments to the Protocol on the Accession of the Peoples' Republic of China to the WTO and customs agreements between China and other economic entities, range from 3% to 10.5% depending on the type of vessel (OECD, 2007b).

⁸ Transmitted in private correspondence to the OECD

⁹ Information provided by the China Shipbuilding Economy Research Center

33. Under the guidelines applicable to the National Economic Plan, the Chinese government can introduce various financial supports intended to assist its shipbuilders to compete in the world markets, thus enhancing the likelihood of China achieving its stated medium to long term objective of becoming one of the largest and strongest shipbuilders in the world. Those measures include (Thorsten Ludwig, Lochen Tholen, 2006):

- *Export tax rebates*: Chinese shipyards can claim export tax rebates for the construction of vessels for export. According to explanation from the China Shipbuilding Economy Research Center, the purpose of the export tax rebates is to avoid repeated collection of tax, and is in line with international practice and WTO rulings.
- *Investment funding reforms*: Shipbuilding companies are allowed to raise capital for plant and site development from public issues or corporate bond sales.
- *Stabilisation of material costs*: To secure a steady flow of steel supplies for the shipbuilding industry, the government plans to deliver up to 80% of the required steel through domestic steel producers. In order to reach this target of supplying high-end materials domestically, the government has introduced measures to support the technological innovation and development of the steel companies..
- *Involvement of foreign partners*: The government's plan is aimed at increasing the local production of key components used in shipbuilding. Therefore, it has allowed Chinese maritime suppliers to create joint-ventures with foreign partners, and has also allowed foreign maritime suppliers to build up their own production plants in China. However, foreign investors in new shipbuilding and marine engine manufacturing units are only allowed to own up to 49% of those ventures, with the Chinese partners retaining a majority (and therefore controlling) interest. Such ventures must also provide shipbuilding technology support by establishing their own R&D units.

34. Since the 1980s, in order to encourage foreign investment, the Chinese government has established several Special Economic Zones in which foreign investors receive preferential tax, tariff, and investment treatment. In terms of shipbuilding and ship repairing, these investments have largely taken the form of joint venture operations between the state or domestic investors, and foreign investors.

Financing and guarantee schemes

35. To speed up the process of privatisation in the shipbuilding industry, and in recognition of the capital intensive character of the industry and its long term investment profile, the Chinese government overhauled the conventional financing and investment system by playing a role to strengthen structural flexibility and providing assistance to facilitate the acquisition of capital. This was achieved principally by encouraging state-owned and private banking institutions to provide financial support to shipbuilders.

36. The Chinese banking sector has traditionally been considered by authorities as a substitute for state financing to ensure a continued flow of funding to its state-owned enterprises, including those involved in shipbuilding. Finance for the shipbuilding sector can be broken down into two general areas: *i)* shipyard finance for capital acquisitions, and *ii)* capital to finance each shipbuilding project. Each can be of critical importance to the well being of the shipyard, because without a source of funds for capital acquisitions, the shipyards would be unable to modernise and would lack the equipment and tooling required to build ships competitively.

37. China Eximbank aims to create a network of links with the shipping industry and its ancillary government sectors. It has created new ground for Chinese shipbuilding as the economy's only export oriented bank that could make Chinese yards even more competitive, as well as offering attractive

packages for ownership buyers. In a special report prepared by the China Daily in May 2005,¹⁰ China Eximbank had provided different types of financial support, such as direct lending and guarantees, for over 90% of Chinese ship exports, and has become the major channel for Chinese ship financing.

38. The bank plays an important role in helping Chinese shipbuilding enterprises compete with their international counterparts, and in accelerating the development of China's shipbuilding industry. Until recently, nearly all the domestic large and medium-sized shipbuilding enterprises, including China State Shipbuilding Corporation (CSSC) were the Bank's key customers, and by the end of 2003, China Eximbank had financed the export of 976 ships totalling 25 million dwt, with loans totalling 65.5 billion yuan. More recently, as well as the Eximbank, other major Chinese banks, such as the China Construction Bank, the Bank of China, the Agricultural Bank of China and the Industrial and Commercial Bank of China, have also become involved in transportation and infrastructure finance.

R&D and innovation

39. China has sought to improve its shipbuilding technologies, and some of the ship models, designed and made entirely in China, have entered into the world mainstream markets. According to figures compiled by China Association of the National Shipbuilding Industry (CANSI), in 2005, a 170 000-ton bulk carrier model designed and made by China received 18 orders, accounting for 45% of the total sales of such ship types in the world. A 300,000 ton ultra-large crude oil carrier made by China has captured 20% of the world market for such vessels. In addition, China has successfully developed an 8 000 teu container vessel and is understood to be able to manufacture container vessels up to 10 000 teu. The first, large Chinese built LNG vessel was successfully delivered in April 2008.¹¹

40. In order to accelerate its technical capability, China has been importing advanced production methods and key equipment including complete production lines, as well as using foreign sourced hardware and software for computer-aided design and computer-aided manufacturing (CAD/CAM). This has enabled Chinese naval architects to become more proficient in the design of ship hulls, compartment layouts, and propeller-rudder combinations that improve speed, efficiency, and structural integrity. Joint ventures between Chinese shipbuilding enterprises and established Japanese and Korean yards are transferring technology, engineering skills, and production know-how to China.

STRUCTURE OF THE INDUSTRY

41. Prior to May 1982, China's shipyards, associated institutes, and factories were organized under the Sixth Ministry of Machine/Building Industry, the Ministry of Communications, and the State Administration of Aquatic Products. The Ministry of Defence also made inputs into the design and construction of all types of naval vessels. Provinces, municipalities, and autonomous regions also were permitted to operate shipyards.

42. More specifically, the construction of larger merchant ships of various types, specialised vessels to serve the oil industry's exploration and development, as well as naval vessels were under the jurisdiction of the Sixth Ministry of Machine Building Industry's umbrella body, the China Corporation of Shipbuilding Industries (CCSI). Some smaller merchant ships, inland waterway vessels, and ship repairs for coastal ships were the province of the Ministry of Communications. Fishing vessels and their repair came under the supervision of the State Administration of Aquatic products.

¹⁰ According to a special report "*China Eximbank puts foreign trade on sound footing*, prepared by the China Daily in May 2005 at <http://app1.chinadaily.com.cn/fortune2005/ft050517p31n.pdf>.

¹¹ Information provided by the China Shipbuilding Economy Research Center.

43. In keeping with reforms to simplify and restructure management and reduce China's bureaucracy, a number of ministries, state corporations, and commissions were merged or eliminated in the years that followed. At the same time, the Ministry's China Corporation of Shipbuilding Industry was merged with the shipbuilding and ship repair functions of the Ministry of Communications to form the new, more unified China State Shipbuilding Corporation (CSSC), which as a state corporation had ministry status under the direct authority of the State Council.

44. In 1994, the CSSC was operating 27 shipyards, 56 equipment manufacturing plants, and had an annual vessel production capacity of 1.5 million dwt. While the Ministry of Communications retained the right to import ships, virtually all other shipbuilding functions except certain ship repairing were transferred to the CSSC. The most obvious effect of this change was that it grouped various shipyards and factories into units, which were formed by taking shipyards and factories that had belonged to other ministries. The CSSC was also charged with the setting of long-term development plans for the shipbuilding industry, deciding strategies, building new facilities, introducing new technologies and establishing subsidiaries abroad. While the Chinese government remained a major stakeholder, the structure of CSSC's operation was altered to reflect a more enterprise style of operation, including taking responsibility for its business performance.

45. At the same time, some Chinese shipbuilding enterprises have entered the capital market; for example Yangzijian Shipbuilding (Holdings Ltd) of Jiangsu Province recently successfully listed in the Singapore Stock Exchange.

Analysis of the structure of the Chinese shipbuilding industry

46. In 1999, the state owned shipbuilding industry was split into two groups; one remained the China State Shipbuilding Corporation (CSSC) while the other became the China Shipbuilding Industry Corporation (CSIC). The CSSC and CSIC are both large, State Owned Enterprises under the direct supervision of the State Council.

47. The CSIC became one of the major shipbuilding and ship repairing service providers in China, consisting of affiliated enterprises mostly located around Dalian in northern China (around the region of the Gulf of Bo-hai), and employs a workforce of over 170 000. It produces around 1 million dwt shipbuilding output per annum. The CSIC possesses design, scientific and technological research institutes, and engages in the trade of both military and commercial ships, marine engineering and marine equipment. In 2000, the CSIC Dalian Shipyard received an order to build five 300 000 dwt VLCCs which set a record in total value and tonnage for a single order.

48. The China State shipbuilding Corporation (CSSC) retained the balance of facilities and activities and remained as a large conglomerate and state authorised investment institution, directly administered by the Chinese central government. It is regarded as the mainstay of the shipbuilding industry in China, and there are 60 sole proprietorship enterprises and shareholding institutions under its umbrella, including some of the most renowned shipbuilding and ship repairing yards, research and design institutes, marine-related equipment manufacturers and trading firms in China.

49. In the field of commercial ships, the CSSC has the capacity to build most types of modern vessels, and can produce a wide spectrum of products, ranging from conventional oil tankers and bulk carriers through to vessels such as LNG carriers, VLCCs, chemical carriers, ro/ro passenger freight ships and offshore facilities. The CSSC's shipyards are principally located around the east coast of the Yangtze River delta and southern regions of China.

50. Changjiang National Shipping Corp (CNSC) is one of the main domestic shipping companies in China. It operates, directly and through various regional subsidiaries on the Yangtze River. CNSC and its subsidiaries own four major shipyards – Jiangdong, Jinling, Qingshan and Yichang – and around 20 smaller yards.

51. Another major grouping is the COSCO Shipyard Group, which is a subsidiary of the China Ocean Shipping Company; the largest of the state-owned shipping operators. The COSCO Shipyard Group owns four shipyards, three of which operate predominantly in the repair and conversion sector and one of which is a new-building yard. Three of the COSCO yards are operated as joint ventures with international partners; the Nantong shipyards – NOSEC and NACKS – are both joint ventures with Kawasaki Heavy Industry (KHI) of Japan and the Dalian yard is a joint venture with Sembcorp of Singapore.

52. The China Shipping Industry Company (CIC), established in 1998, is a subsidiary of the China Shipping Group, which is itself the second largest of the state-owned shipping companies. The CIC owns six yards, which are predominantly involved in the repair and conversion sector rather than shipbuilding, although ChengAnWei yard does have shipbuilding capability and DiGang offers newbuilding and ship scrapping services as well. Three of the yards are located in Shanghai, two in Guangzhou (Guangdong province) and the other in Anhui.

53. The Fujian Shipbuilding Industry Group is owned by Fujian province, and comprises four shipyards. The Mawei and Xiamen yards are the two largest facilities and are predominantly newbuilding yards. The other yards, Southeast Shipyard and Shanyou Marine Steel Structure yard, are smaller and have been involved in both the newbuild and repair sectors.

54. Finally, YiuLian Dockyards is a Hong Kong-based group which owns three shipyards located at Hong Kong (China), Shekou and Zhangzhou. These yards are predominantly involved in repair work.

Ownership structure, joint ventures, foreign participation

55. The general Guidelines on Foreign Investment provide the basis against which foreign investment proposals are judged (including in the shipbuilding sector), in particular with respect to the resulting industrial competitiveness and environmental protection. In general terms, proposals for foreign participation are classified under one of four categories (general terminology only):

- Stimulation (may be eligible for special conditions or assistance);
- Permitted;
- Permitted with restrictions;
- Prohibited.

56. The four most common types of co-operation between Chinese and foreign companies are joint ventures, partnerships, Chinese owned companies (with at 51% Chinese ownership) and Chinese holding companies (with Chinese investors being the largest, even if not majority, stake holders).

57. The national medium and long term plan for the shipbuilding industry provides that foreign shipbuilders are allowed to reorganise, acquire or jointly fund shipbuilding enterprises provided they hold no more than 49% of the shares. The same rules apply to enterprises engaged in the production of ship components, including new ventures such as those to produce medium and low-speed ship diesel engines and crankshaft manufacturing enterprises.

58. Further, in order foster advanced technology and management skills and to promote foreign involvement in the sector to ensure sustained development, the government also requires Sino-foreign joint ventures to set up technical centres to absorb and disseminate technologies transferred by foreign investors. Such joint ventures have provided China with an operational capability that may not have otherwise existed, and also provided a short-cut way to close the gap between China and the established market, both in terms of technology and structure. A number of joint ventures have been established in recent years, particularly with established Japanese and Korean yards, to facilitate the transfer of technology, engineering skills and production know-how to China.

Rationalisation/changes to location distribution of yards

59. Ever since China adopted its policies of reforming and opening its economy, it has laid a foundation in capital, skills, technology and infrastructure for its shipbuilding industry. In particular it has exploited its skilled and relatively low-cost labour force, which is one of China's most important natural advantages. The entry of large, foreign shipbuilding enterprises reflects this opening of the market and has resulted in a significant expansion of production capability, which in turn has strengthened the competitiveness of the Chinese shipbuilding industry. MOFCOM's (Ministry of Commerce of the People's Republic of China) statistics show that in 2005, among the national programmes proposed for foreign co-operation and investment, the shipbuilding industry filed 104 separate proposals, with contract value of around 1 369 million yuan.

60. While at present there are few wholly owned foreign enterprises in China's shipbuilding or marine equipment industry, this situation is gradually changing. For example, in recent years Korean investments have included, Daeyang Shipping Co. and Oriental Precision & Engineering Co. in Dalian; the Samsung Group in Ningbo; Daewoo Shipbuilding at Bajiao port in Yantai and Doosan Engine and STX Engine in Dalian (MOFCOM and China's related ship Associations, 2005). Foreign capital from Europe, Korea, the U.S. and Japan has also been invested in enterprises engaged in support activities, such as diesel parts, propellers, deck machinery, cabin and outfitting equipment, marine automation systems, marine electronic products and coatings and cables. Foreign enterprises investing in the marine equipment manufacturing industry include Wartsila, ABB and Catepillar.¹²

Workforce (including training and education)

61. China's principal advantage on the world market has always been the price of its vessels, which is largely a function of generally lower production costs; in particular its abundant supply of skilled, low cost labour. The low cost of labour is particularly important as wage costs represent roughly one third of the overall cost of constructing a vessel. However, since the 1990s, the average production cost in China have escalated, in part due to the surging prices of production materials, but more importantly from the perspective of Chinese competitiveness, because of the increasing cost of labour without commensurate improvements in productivity, which is low by international standards. According to a report by COSTIND,¹³ the average production output in Japan and South Korea is around 10-15 times more than that in China, and furthermore Japan and South Korea's average output value is 20 times higher than in China. A more recent appraisal by the China Shipbuilding Economy Research Center¹⁴ suggests that the production efficiency has been increasing rapidly, and that at present the per capita output and per capita production values are about 1/6-1/4 of those of Japan and Korea.

¹² Information provided by the China Shipbuilding Economy Research Center.

¹³ Source cited from 民用船舶工業發展“十五”計畫綱要 (Guidelines for the 10th national five-year Economic Plan), 2005年11月21日.

¹⁴ Transmitted in correspondence to the OECD.

62. This lower productivity is apparently offsetting the competitiveness of the Chinese yards in the world market, and is threatening China's ambition becoming the major shipbuilder economy in the world. Under the 11th national 5-year Economic Plan, China is aiming to improve the productivity of the industry by introducing measures such as training of the workforce, renovation and modernisation of equipment in State-owned shipbuilding enterprises, and the attraction of foreign technology and capital. The Chinese government's objective is to narrow its productivity gaps with Japan and South Korea from current one-sixth to between one-fourth and one-third by 2010.

Construction/production capabilities

63. The strength of the Chinese shipbuilding industry has been its ability to build competitively priced basic vessels, especially bulk tankers. While its shipbuilding industry is increasingly diversifying into more complex and technologically advanced vessels, this heavy reliance on bulk vessels remains. While there was a strong increase in orders for tankers in 2006 (the crude oil/oil product tanker orderbook increased from 196 to 348 in that year) this appeared to be a temporary blip, and new orders for tankers stalled in 2007. Significantly, the 2007 figures showed that the 1201 bulk/ore carriers on order totalled 52.43 million gt, accounting for 54% of the overall orderbook, while tankers of various kinds accounted for around 21% (Lloyd's Register Fairplay, 2005, 2006, 2007). In its published figures for 2006 COSTIND also noted that Chinese shipbuilders were committed to building 55 VLCCs which was about one third of the global demand. In addition, the orderbook included 53 Capesize bulk carriers (170 000 dwt) which accounted for around 45% of the world total (COSTIND, 2007).

64. However, also significantly, the 2007 orderbook highlighted the increasing diversification of the Chinese shipbuilding industry, as it also contained significant orders for a broad range of more complex and technologically advanced vessels, such as vehicle carriers (51), LNG/LPG carriers (26) and 496 container ships (Lloyd's Register Fairplay December 2007). Therefore, while it is still fair to characterise the Chinese shipbuilding industry as being heavily dependent on the bulk carrier market, it should also be recognised that it is rapidly diversifying, and it is likely that this diversification will enable it to increasingly compete on the international export market for a wide range of different vessel types.

Access to and development of technology

65. The CSSC has expressed its intention to ramp up production in the hi-tech sector of the market, including LNG carriers and vessels that support the offshore oil and gas industry, such as floating production, storage and offloading units (FPSOs). The CSSC's wholly owned subsidiary Hudong-Zhonghua Shipbuilding is currently China's only builder of LNG vessels.

66. According news released in September 2007¹⁵, Lloyd's Register (LR), currently operating 11 offices in China with a regional headquarters in Shanghai, committed several million yuan in 2007, developing a series of training and educational courses and related infrastructure in China. The Lloyd's Register Maritime Institute in Shanghai was designed to provide a centre of learning from where working surveyors and auditors can share their technical knowledge with China's shipbuilders, owners and maritime experts, and support design and related research and development based on industrial greatest demand. Those efforts will effectively strengthen design and R/D competitiveness in volume ship types, such as tankers, bulk carriers and container vessels.

¹⁵ Lloyd's Register-China Site at <http://www.lr-china.org/en/news+events/newsItem.php?newsID=10>.

Role of shipbuilding associations

67. China has a number of trade associations, research and design institutes and societies related to the shipbuilding industry. Their roles are to provide technical consultancy services and advice, as well as providing a forum for industry news, comments, analysis, and developments. Some of the institutions represented are as follows:

- *China Association of the National Shipbuilding Industry (CANSI)*: This is a national, non-profit organisation of the shipbuilding trade that has been established to provide a bridge between Government departments and its industry members. The CANSI is the most significant organization in the shipbuilding industry, with its members accounting for 90% of national production. Its members consist of shipbuilders, ship repair contractors, marine engine manufacturers, marine instrument manufacturers and other marine equipment producers, ship designers, surveyors and inspectors.
- *China Classification Society (CCS)*: The CCS is a technical organisation providing classification and statutory surveys of ships, offshore installations, containers and other related equipment and materials, as well as providing technical consultancy services. The CCS is a member of the International Association of Classification Societies (IACS) and has established 39 branch offices in China and 20 branches among 14 countries and regions. The CCS is the only specialised body in China that carries out international standard classification surveys of ships.
- *The China Classification Society Industrial Corporation (CCSI)*: This is a CCS subsidiary engaged in the supervision and inspection of engineering equipment, enterprise management consulting, technological development, machinery equipment repairing, non-destructive testing service, personnel training and technical consulting service. The CCSI has established subsidiaries in the majority of domestic coastal cities, and runs joint ventures on insurance and risk management respectively with British Thomas Miller and American ABS.
- *China Shipbuilding Engineering Association*: This Association, established in 1943, is a non-profit organization with a membership of more than 30 000 national professionals from research institutions, academies and industry. The Association aims to promote the development of the shipbuilding industry by exchanging knowledge and promoting advanced technology and consultancy services.
- *Technology Research & Economy Development Institute*: This Institute, situated under the umbrella of CSSC, is a research institution providing services to the national shipbuilding industry. Its business scope includes information collection and analysis, consultancy services on ship standards and specifications, and marine products licensing.

Role of minor yards and repair/ship conversion capability

68. China has a large number of small yards predominantly located along its main river systems, many of which build or repair small vessels, such as passenger/leisure craft, barges, river boats, harbour craft and fishing vessels, for local use. Tugs and fishing vessels are important sectors for small Chinese yards, and while most of these vessels are likely to be for domestic clients, some vessels are produced for export. One emerging sector in which smaller Chinese yards are becoming active is the offshore support vessel sector, which serves the growing offshore activities of China. In addition, there are several less well know yards, building high speed craft which serve the needs of the domestic market for local and inter-provincial transportation. There is also a fledgling luxury boat sector.

69. China also possesses many yards that are primarily dedicated to ship repair, most of which are small and totally dedicated to meeting local needs. However, over the last few years, ship repair and conversion has gradually become a mainstream business due to the fact that low labour costs and the plentiful availability of capacity at these small and medium shipyards have attracted the attention of large local and foreign contractors. For international operators, these yards could undercut competitors (such as Singapore) in repair work by as much as 30%, and would therefore be attractive economic propositions.

70. Ship repairing in China is concentrated in the areas of Shanghai, Guangzhou and Gulf of Bohai. The market is mainly shared by China Shipping Industry Company (CIC), China Ocean Shipping (COSCO) and other smaller yards. COSTIND's report of March 2007 showed that the trend in ship repair and conversion activities was gradually moving toward large scale and technology intensive activities. In 2006, China undertook repair work on bulk carriers involving vessels totalling 365 000 tons and completed 59 vessel conversions that included double-deck oil tankers and, RoRos. Importantly, reported profits generated by ship conversion activities totalled 240 million yuan in 2006, a sharp increase from past years (COSTIND, 2007).

71. Under the consideration of using constrained capacity to maximise overall profits, the trend is becoming more apparent that many ship repairs are switching their core business from ship repairing to ship conversion. For instance in 2007, COSCO the largest repair company in the country, allocated half of its workforce to conversion which contributed almost 80% of its yearly earnings. Moreover, reflecting the upswing of production materials and domestic labour costs, China's ship repairers announced they would raise prices in stages by a total of as much as 30% in 2008, to bring its prices more in line with repair yards elsewhere in Asia (Jim James 2008).

Role of the marine equipment industry

72. COSTIND's report, published in March 2007, noted with concern that the Chinese shipbuilding industry was facing challenges due not only to the appreciation of the Chinese yuan, but also because of shortcomings in the marine equipment industry, which was unable to keep pace up with the rapid growth of the shipbuilding sector (COSTIND, 2007).

73. In China, about 50-60% of the equipment and components for shipbuilding industry are imported from other countries, and this dependence on imports - especially high-end technology and key equipment and components - not only reduce profit margins, but also hinder China's efforts to develop a fully integrated shipbuilding sector. The development of the marine equipment industry to underpin the growth of the shipbuilding sector overall has been identified as a key objective, and an objective of the current Economic Plan is that 60% of the parts used on China-made ships should be domestically produced, up from 46% in 2006.

PRINCIPAL CONSTRUCTION FACILITIES

Design capabilities

74. With respect to commercial shipping, the CSSC and CSIC are capable of designing and building modern ships complying with the international rules and requirements. In addition to the in-house design centers established by the CSIC and CSSC, there are a number of independent research and design centers located nationwide to provide ship design services. These centers include:

- China Ship Design & Research Centre Co., Ltd. has established a platform to provide engineering and design services ship and rig building companies.

- China Shipbuilding Industry Institute of Engineering Investigation & Design (CSEI): This holds qualification for engineering surveying, supervision and consultation of ship design projects.
- Jiujiang Precision Measuring Technology Research Institute: This is the research institute of China State Shipbuilding and is especially engaged in researching precision measuring, processing and metering technology.
- Marine Design and Research Institute of China (MARIC): This operates a marine design and research institute in China and is also the national engineering research centre for ship design.
- Changjiang Ship design Institute: This is the largest ship design and research institute in the transportation area.
- Guangzhou Marine Engineering Corporation (GUMECO): Under the leadership of CSSC, GUMECO functions as an engineering design and scientific research organisation in the South China region, and specialises in areas such as offshore engineering, ship design, electromechanical products, steel structure engineering and advisory services.
- China Ship Research & Design Center: This state-owned enterprise is the research institute of the China Shipbuilding Heavy Industry Corporation. Its services cover the field of national defense, taking charge of China's whole ship design, research and development.
- Shipbuilding Technology Research Institute (STRI): STRI, attached to CSSC, is a research and development organization concerned with shipbuilding technology.
- The Ninth Design and Research Institute: Its functions focus mainly in the design and research areas of hydraulic and special engineering.
- Shanghai Merchant Ship Design and Research Institute: This is capable of designing cargo vessels, offshore and military support vessels and harbor workboats.

INDUSTRY PERFORMANCE

75. Generally speaking, in parallel with the shipbuilding industries in other parts of the world, China has benefited from the very strong international shipbuilding market. In 2006, the total production output value for major producers in the shipbuilding sector totaled 172.2 billion yuan, a 37% increase over the previous year. With respect to its completions for that year, COSTIND data shows that bulk carriers constituted the largest single ship type, accounting for 45% of total output (a slight reduction on the previous year), followed by oil tankers at 33% and container ships at 14%.

Output and world share of production

76. According to figures published in China, its shipbuilding industry developed rapidly during the period of the 10th National 5 Year Economic Plan (2000-2005), with an average annual growth rate of 29%. COSTIND's statistics also indicated that over the period 2002-2005, China boosted its shipbuilding output by more than 40% a year. In 2006 Chinese shipbuilding output reached 14.5 million dwt, accounting for 19% of the global market. This proportion is slightly higher than the Lloyd's Registry-Fairplay figures for the year (14.8%) derived on the basis of completions expressed in gt (as opposed to dwt) COSTIND also estimated that in 2006 China's new orders reached 42.5 million dwt, a 30% share of the global market (which would make it one of the fastest growing industries) while the overall orderbook reached 68.72 million dwt, or 24% of the global market (COSTIND, 2006; COSTIND 2007).

77. On the basis of internationally published information on shipbuilding production, in 2007 China remained the third largest producer of commercial vessels, behind Korea and Japan (see Table 5).

Table 5. World shipbuilding production 2007

Location of Build	Number of vessels	Output in m.GT	Percentage
Korea	425	20.20	35.68%
Japan	539	17.31	30.58%
China	643	10.41	18.39%
Germany	69	1.34	2.36%
Italy	25	0.70	1.23%
Denmark	4	0.85	1.50%
Croatia	25	0.69	1.21%
Chinese Taipei	16	0.66	1.16%
Poland	44	0.56	0.98%
Turkey	109	0.53	0.93%
Romania	43	0.43	0.75%
Philippines	10	0.36	0.63%
Rest of world	737	2.4	4.24%
Total	2,689	56.6	

Source: World Shipbuilding Statistics, Lloyd's Register Fairplay December 2007.

78. On this basis, in 2007 there was a significant gap in production between China and its principal competitors, but the true state of its world rank may be better judged by examining orderbooks rather than production.

Analysis of orderbooks

79. At the end of 2007, the shipbuilding orderbook was dominated by South Korea (Table 6) which had captured 126.5 million gt, equal to 38.37% of the total world orderbook. However, the Chinese shipbuilding industry's share of the orderbook also surged, and at that time had overtaken Japan by a clear margin (29.65% compared to 19.35% respectively). While this change in relativity might not be immediately reflected in output data, it appears as if in the course of 2007 China has placed itself in a clear position to overtake Japan as the world's second largest producer.

80. As well as Korea's tightening grip on the orderbook, also of interest is the rapid growth in the orderbooks of a number of emerging economies, particularly the Philippines (which has overtaken Germany), Vietnam and India. If these trends are confirmed by future additions to the orderbook, then this could be the start of a major re-ordering in the structure of the world's shipbuilding industry.

Table 6. Total World Newbuilding Orderbook (December 2007)

Location of Build	No of vessels	Million gt	% on gt	Million cgt¹⁶
South Korea	2,242	126.53	38.37%	63.39
China	3,139	97.76	29.65%	50.22
Japan	1,495	63.81	19.35%	30.71
Philippines	116	5.16	1.56%	2.49
Germany	203	4.17	1.26%	3.78
Vietnam	206	3.20	0.97%	2.14
Romania	146	3.04	0.92%	2.12
Chinese Taipei	67	2.83	0.86%	1.68
India	246	2.61	0.79%	2.03
Italy	118	2.57	0.78%	2.95
Turkey	337	2.35	0.71%	2.34
Poland	122	2.03	0.61%	1.67
Croatia	69	1.99	0.6%	1.20
Denmark	22	1.46	0.44%	0.66
Rest of the World	1,527	10.19	3.09%	10.32
Total	10,055	329.7		177.7

Source: World Shipbuilding Statistics, Lloyd's Register - Fairplay December 2007.

81. Table 7 shows details of the most recent orderbook data for Chinese shipyards by major vessel types. This highlights the significant contribution still being made to the Chinese orderbook by bulk carriers and to a lesser extent by crude oil tankers and container vessels. The very strong contribution by bulk carriers could have a significant impact on the overall orderbook if demand for such vessels were to decline due to the slowing of the world economy. In that case, the true test of the versatility of the Chinese shipbuilding industry will be whether it can attract a sufficient number of orders for other types of vessels to minimise the impact of any slippage in demand.

¹⁶

CGT is Compensated Gross Tons is a measure, developed by a group of major shipbuilder associations in conjunction with the OECD that provides a common yardstick to reflect the relative output of merchant shipbuilding activity in large aggregate. It is widely used by the shipbuilding industry.

Table 7. The Orderbook of Chinese Yards (December 2007)

Type of Vessel	No	Million gt	% on gt	Million cgt
Bulk/Ore Carriers	1,201	52.431	54.0%	22.555
Crude Oil Tankers	165	15.611	16.1%	5.268
Container Vessels	496	13.075	13.5%	9.020
Oil Products Tankers	182	4.564	4.7%	2.505
General cargo ships	423	4.363	4.5%	4.034
Chemical/Oil Products Tankers	219	2.861	3.0%	2.201
Vehicle carriers	51	2.396	2.5%	1.415
LNG/LPG carriers	26	0.673	0.7%	0.659
Remainder	96	0.984	1.0%	1.148
Total	2,859	96.958		48.805

Source: World Shipbuilding Statistics, Lloyd's Register - Fairplay December 2007.

Domestic/export production mix

82. The boom in China's shipbuilding industry also reflects developments in the shipping industry, which has seen its domestic shipping companies expanding their fleets, driven in turn by China's rapid economic development and its growing need for foreign energy and mineral resources. However, the most recent significant development has been the serious entry by Chinese shipbuilders into the international shipbuilding market to take advantage of the very buoyant market for new vessels,

83. After years of producing vessels for domestic customers, the Chinese shipbuilding industry is now actively seeking to expand its international presence, to both exploit the buoyant newbuilding market, and to utilize rapidly expanding newbuilding capacity. COSTIND's statistics show that exports by Chinese yards reached USD 8.1billion in 2006, an increase of 74% over the previous year, with top destination markets being Germany, Singapore, China (Hong Kong), the Marshall Islands, Malta, Australia, Japan, Panama and the United Kingdom. In particular, exports to Germany and Singapore accounted for 30% of the total export volume in 2006.¹⁷

84. The principal types of ships exported included 6,000-and-under TEU container ships, bulk cargo carriers with a carrying capacity up to 150,000 tons and oil tankers up to 100,000 dwt. The State-owned shipbuilders accounted for 78.1% of export sales, Sino-foreign joint ventures 16.8%, and privately owned enterprises 5.1%. According to statistics from Chinese Customs in the first six months of 2007, exports of ship related items reached a record of USD 5.49 billion, a 61% increase compared with the same period of the previous year.¹⁸ Germany and Hong Kong were the top three overseas markets (compiled by COSTIND, 2007).

¹⁷ The statistics were released by COSTIND in March 2007 referring to “2006 年全國船舶工業經濟 運行報告” (“Annual report on national shipbuilding industry, 2006”).

¹⁸ According to the statistics in 2005, published by the Chinese Custom, the total ship exports amounted to US\$4.66 billion.

85. While ship exports were significant in 2006, more recent COSTIND data, compiled from Customs statistics, indicate that total exports of vessels and related products in the first three quarters of 2007 totalled around USD 8.7 billion, a 62% increase compared to the same period in 2006. Products were shipped to 142 destinations. In the same period, total imports of vessels and related products were USD 940 million.

Financial performance of yards

86. COSTIND statistics show that China's shipbuilding industry made a record profit in 2006 of 9.6 billion yuan (USD 1.23 billion), from an industry turnover of 172 billion yuan (USD22 billion). The building of new ships was the most profitable activity, generating profit of 5.3 billion yuan, followed by ship repairing services (2.6 billion yuan) and ship related products and manufacturing of accessories (0.6 billion yuan). The CSSC, which accounted for 40% of the China's output, reported profits exceeding 5 billion yuan, and the yard took 100 billion yuan worth of new orders. In the first half of 2007, the total production value amounted to 101.7 billion yuan, an increase of 48% over the same period in 2006 (COSTIND, 2007).

Productivity and competitiveness

87. Low productivity and comparatively poor management have been identified as the main factors limiting the growth of Chinese shipbuilding. COSTIND's data showed that China, despite ranking third in shipbuilding output over the past 10 years, had an average productivity that was only about one-sixth that of Korea and other major producing economies. However, this productivity disadvantage was offset by China's relatively strong advantage in labour costs, which are only 14% of Japan's and 12% of Korea's.

88. The Chinese government has recognised that this productivity gap has to be closed, and has set the objective of reducing the gap between Chinese shipbuilders and leaders in the field by between one-third and one-quarter by 2010. One of the measures taken in response to this objective in the 11th Economic Plan has been the building of co-operation with international companies and institutes, and as a result foreign direct investment of some USD 220 million was made in China's shipyards in 2005, up 45% from the previous year. Despite the need for the injection of foreign capital and expertise, China continues to enforce a cap of 49% for foreign shareholding in order to retain control over the industry.

FUTURE DEVELOPMENTS

89. In recent years the capacity of China's shipbuilding industry has been undergoing a rapid growth compared to Japan, Korea and Europe, exploiting its natural advantages in low labour and other costs, attractiveness to Foreign Direct Investment, and the strong foundation of its existing shipbuilding sector.

90. The Chinese government has released its estimate of current and future global shipbuilding capacity, including the target of 23 million dwt set for Chinese shipbuilding capacity by 2010 (Table 8).

Table 8. 2010 global shipbuilding capacity forecast

Location	2006 (million dwt)	2010 (million dwt)
Japan	29.4	32
Korea	25.3	32
Europe	5.3	6
China	14.52	23
Global	77.1	98

Source: 中國船舶工業綜合技術經濟研究院 (The Technology Research and Economy Development Institute, CSSC).

91. However, according to information released by CANSI May 2007 (compiled nationally from shipyards), China's shipbuilding capacity will exceed 40 million dwt a year in 2010, if new yards planned by investors are completed as planned (Table 9). These estimates by CANSI indicate that this projected level is much larger than the plans of Chinese Government, which anticipated a total shipbuilding capacity of 23 million dwt at the end of the decade.

Table 9. 2010 China shipbuilding capacity forecast

Province	2006 (million dwt)	2010(million dwt)
Shanghai	5.42	10
Jiang Su	3.28	10
Liao Ning	2.46	6.5
Zhe Jiang	1.17	6.5
Shan Dong	0.3	6
Guang Dong	0.66	2.5
China (total)	14.52	41.5

Source: CANSI (18/5/2007).

92. The current expansion is largely driven by the very buoyant demand for newbuildings, which (if current trends are sustained) could result in an orderbook for local yards of around 73 million dwt by 2015. This has prompted the Chinese shipbuilding and ship repair industries to embark on a number of facility development projects, ranging from new shipyard construction, yard relocations, facility modernizations and upgrades and the building of individual new docks and berths.

93. However, because of the growing risk of shipbuilding overcapacity, the Chinese government has implemented methods of control, including closing down unlicensed yards, denying to issue licenses for enterprises with inadequate facilities, securing state approval for new enterprises exceeding 100 000 dwt in capacity, regulating investment of at least 2 billion yuan in new projects, and requiring the Chinese participation in equity joint ventures with foreigners to be at least 51% (Jim James, 2008).

Investment in existing facilities

94. Looking forward, CSIC and CSSC, the two state-run groups which account for three-fifths of the total shipbuilding capacity in China, are planning to conduct facility expansion in the near future as shown in the following tables.

Table 10. Facility Expansion Plan of CSSC Member Shipyards

Shipyards Name	Facility expansion plan	Completion date	Planned capacity expansion (m.dwt)
Shanghai Waigaoqiao Shipyards	Expansion of capacity in two-phase construction	2008	2.60
Chang Xing Shipyards	Merger of Hudong Shipyards and Jiangnan Shipyards	2015	8.00
Zhongming Shipyards	Transfer of Shanghai Shipyards	2010	1.50
Nansah Longxue Shipyards	Merger of Guangzhou Wenchong and Guangzhou Shipyards	2008	3.00
Total			15.10

Source: Suzuki (2006), compiled by Thorsten Ludwig, Jochen Tholen, 2006.

Table 11. Facility Expansion Plan of CSIC Member Shipyards

Shipyard name	Facility expansion plan	Completion date	Planned capacity expansion (m.dwt)
Dalian Shipyard	VLCC dock expansion	2009 - 2010	4.80
Bohai Heavy Industries	New VLCC dock expansion	2007	1.50
Haixi Wan Shipyard	Transfer of Qingdao Beihai Shipyard	2015	4.68
Qinhuangdao Shipyard	Shanghaiguan Shipyard (construction of JV shipyard)	2010	1.50
Tianjin Binhai Shipyard	Transfer of Xingang Shipyard	2011	3.00
Total			15.48

Source: Suzuki (2006), compiled by Thorsten Ludwig, Jochen Tholen, 2006.

Green-field developments and modernisation/expansion plans

95. Recently, substantial investments in capacity have been made by emerging shipbuilding economies to take advantage of export market possibilities. These developments, many as green-field investment in new facilities, have been encouraged by government policies and frequently enjoy access to a variety of government assistance.

96. For its part, the Chinese Government set out clear goals in the 11th national 5-year Economic Plan to improve domestic capacities on research, design and innovation, as well as strengthening infrastructure capable of building larger and more complex ships. The measures taken by the Chinese government include:

- Measures to enhance the self-innovative ability of the industry as well as promoting the upgrading of its industrial structure and regulating its development;
- The promotion of investment and joint ventures;
- The development of domestic brands by encouraging the production of key components;
- Increasing productivity and management skills, and enhance risk control.

97. More specifically, to increase the competitive edge of its shipbuilding industry, China encouraged technological advances in the shipbuilding industry through independent Chinese research and developments, as well as tapping the foreign investment market through equity-for-technology and market-for-technology deals. This has enabled China to develop product manufacturing parks and production bases to facilitate the manufacture of advanced products.

98. As the over-sighting body for the industry, COSTIND has also laid out some plans to guide the future development of Chinese shipbuilding industry to enable it to design and manufacture:

- High-tech, high-function and special ships, and large ships of 100,000 dwt and above;
- Passenger ship, ro-ro passenger ships, passenger-cargo ships and train ferries;
- LPG ships and LNG ships with a handling capacity of 5,000 cubic meters and above;

- Container ships with a capacity of 3,000 TEUs and above;
- Marine power systems, power plants, and special support machines; design and manufacturing of large deep-sea fishing boats, marine drill vessels, oil rigs, marine floating production storage and offloading (FPSO) structures and other offshore engineering equipment;
- Control and automation products, telecom and navigation equipment, instruments and meters and other marine equipment. (China View Website, 2006).

Indicators of future demand

99. This significant investment in new and expanded facilities will gradually come on-line at a time (expected to be around 2010/11) when demand for newbuildings may start to decline. Of course, as well as its own significant increases in capacity there will also be significant pressure from other emerging economies that are also making substantial investments in new capacity (Vietnam, India and the Philippines amongst others), and China's shipbuilders will have to operate in an increasingly competitive market. The relative vulnerability of the Chinese market because of its heavy dependence on a limited range of ship types (heavily weighted towards bulk carriers) has already been raised.

100. It is impossible to foretell the future with respect to either eventual newbuilding demand, or the success of the Chinese industry to diversify its product base sufficiently to minimise (if not avoid) the impact of declining worldwide demand for new vessels. One potential pointer to this is to examine recent new orders (as opposed to existing orderbooks), in order to judge whether the Chinese shipbuilding industry is maintaining its momentum on new orders, and whether the significant reliance on bulk carriers is continuing. (see Table 12).

Table 12. New Orders reported during 2007

Location of build	Orders Reported		
	Number of vessels	Million gt	Percentage
Korea	1,231	67.96	41.23%
China	1,698	58.01	35.20%
Japan	606	20.67	12.54%
Philippines	65	3.54	2.15%
India	115	1.92	1.17%
Chinese Taipei	27	1.22	0.74%
Germany	61	1.20	0.72%
Vietnam	72	1.48	0.90%
Rest of world	976	8.8	5.34%
Total	4,851	164.8	

Source: World Shipbuilding Statistics, Lloyd's Register - Fairplay December 2007.

101. The first point to note is the strength of the Korean shipyards, which in 2007 captured more than 41% of total orders reported. Second, these numbers confirm that China has clearly overtaken Japan,

which has slipped to record low proportions of world orders reported. Meanwhile, the Philippines and India are maintaining their recent strong showings, while Vietnam has failed to maintain its momentum. On this basis the Chinese shipbuilding industry must have some confidence that it can maintain a significant share of future orders. Table 13, compiled from 2007 quarterly statistics released by Lloyd's Register - Fairplay, shows the detailed Chinese new orders, by principal vessel types.

Table 13. China - Reported new orders/2007

Ship Type	Number of vessels	Million gt	% in million cgt
Bulk/Ore Carriers	814	36.51	69.44%
Container Vessels	166	5.42	10.31%
Crude Oil/Oil Prod Tankers	87	4.52	8.6%
Vehicle Carriers	40	1.91	2.26%
General Cargo Vessels	164	2.28	4.34%
Chemical/Oil Product -Tankers	71	1.33	1.9%
LPG/LNG Carriers	9	0.05	0.1%
Other vessels	132	0.56	1.06%
Total	1 419	52.58	

Source: compiled from statistics published in World Shipbuilding Statistics, Lloyd's Register Fairplay March-December 2007.

102. The new orders reported in 2007 indicate a strong emphasis on bulk and ore carriers; a traditional strength of the Chinese shipbuilding industry. This outcome means that the proportion of these types of vessels in the orderbook will increase, with a commensurate decline in the proportion of container vessels, tankers and other ship types. The fact that container vessels overtook tankers as the second largest category over this period may be an indication of future trends, which may be significant given that container vessels are generally more technologically complex than tankers.

SUMMARY AND CONCLUSIONS

103. The global economy remained strong in the first half of 2007, with growth running above 5%. During the same period, China's economy, one of the current drivers of global economic growth was growing much more rapidly, at around 11.5%. However, the recent turbulence in the global markets, while not greatly affecting the 2007 outcomes, has led to baseline projections for growth in 2008 being reduced by almost 0.5% to 4.8%.¹⁹

104. Despite this dip in confidence, the overall sentiment for global economic growth remains generally positive, and in consequence this can be expected to help sustain international trade at around the current levels, thus maintaining a historically high level of demand for both bulk and container shipping. Global energy and resource demand, especially in the emerging economies, is expected to remain high, and these factors all act to indicate a continuation of strong demand for new vessels.

105. The Chinese shipbuilding industry has become one of the biggest in the world, and is continuing to expand vigorously. It has now overtaken Japan as the second largest in terms of the orderbook and new

¹⁹ According to the statistics and forecast of world economic outlook, released by the IMF (International Monetary Fund) in October 2007.

orders, if not as yet in production. It has been helped in this task by being considered as a key strategic industry to meet domestic need, enter the export market and act as a locomotive to encourage satellite industries. The 11th 5-year Economic Plan launched in 2006 has recognised the importance of the shipbuilding industry, which has been specifically included in a Five Year Plan for the first time.

106. The Economic Plan has set the goal of China become one of the world's largest ship producer by around 2020, and the government has introduced a number of measures to facilitate this development. These measures include financial support, expansion of capacity, consolidation of the industry structure, upgrading the capability of manufacturing, research and design, strengthening technological cooperation with international companies and institutions, encouraging foreign investment and measures to tap into technological and business know-how. The government policies and measures provide effective incentives to industrial expansion plans.

107. However, while these ambitious plans are already underway, some hurdles and risks remain. In particular, the strong possibility of rapidly growing overcapacity is an increasing threat, especially if global growth stagnates. Since 2005, prices vessel have started to decrease and several international institutes anticipate that the global shipbuilding market could be reversed in the next few years; which is when much of China's planned capacity expansion will be completed. Also, while China's natural advantages of lower production costs will remain, these are likely to deteriorate, particularly after the introduction of the new Labour Act in January 2008, unless it can also increase productivity and technological innovation to reduce the gaps that exist with its main competitors.

ANNEX I

Major Shipbuilding and Repair Yards in China

Name	Location (city/state)
4807 Military Shipyard	Fuan, Fujian
Baima Shipyard	Fuan, Fujian
Beihai Shipyard	Qingdao, Shangdong
Bohai Shipyard	Huludao, Liaoning
Boluomiao Shipyard	Guangzhou, Guangdong
Changzhou F.R.P Shipyard	Changzhou, Jiangsu
Changzhou Jianghai Hi-Speed MotorCraft Yard	Changzhou, Jiangsu
Changzhou Shipyard	Changzhou, Jiangsu
ChengAnWei Shipyard	Guangzhou, Guangdong
<u>Chengxi Shipyard</u>	Jiangyin, Jiangsu
China Shipping Industry Co. Ltd.(CIC)	Shanghai
Chongqing Shipyard	Chongqing, Sichuan
Chuandong Shipyard	Qingdao, Shandong
Chuanjiang Shipyard	Changshou, Sichuan
Dalian Shipyard	
<u>Dalian New Shipyard</u>	Dalian, Liaoning
DiGang Shipyard	Wuhu, Anhui
Dongfang Shipyard	Wenzhou, Zhejiang
Dongfeng Shipyard	Hangzhou, Zhejiang
<u>Dongguan City F.R.P Shipyard</u>	Dongguan, Guangdong
Dongguan Jianglong Shipbuilding Ltd.	Qingdao, Shandong
Donghai Shipyard	Shanghai
Dongtai Shipyard	Dongtai, Jiangsu
Fanyu Lingshan Shipyard	Qingdao, Shandong
Fujian Fishing Vessel Shipyard	Fuzhou, Fujian
Fuming Shipyard, Ningbo	Ningbo, Zhejiang
Fuyang Feiying Craft Ltd.	Fuan, Fujian
Gaohua Hi-Speed Ship Eng. Ltd	Wuhan, Hubei
Gezhouba Group Shipyard	yichang, Huber
Guangdong Ship F.R.P Factory	Qingdao, Shandong

Guangzhou Dengtai Shipping Ltd.	Qingdao, Shandong
Guangzhou Fanyu Xinghua Shipyard	Qingdao, Shandong
Guangzhou Gaohua Hi-speed Yacht Building Ltd	Qingdao, Shandong
Guangzhou Sea-Bus Eng. Ltd.	Qingdao, Shandong
<u>Guangzhou Shipyard Internl</u>	Guangzhou, Guangdong
Guangzhou Fishing Vessel Shipyard	Guangzhou, Guangdong
Guangzhou Huangpu Shipyard	Qingdao, Shandong
<u>Guang Zhou Wenchong</u>	Guangzhou, Guangdong
Guangzhou Xinggang Shiprepairing Eng. Ltd.	Qingdao, Shandong
Guijiang Shipyard	Wuzhou, Guangxi
Haian Shipyard	Nantong, Jiangsu
Haidong Shipyard	Taizhou, Zhejiang
Haimen Shipyard, Nantong	Haimen, Jiangsu
Henan Huaibin Shipping Company's Shipyard	Qingdao, Shandong
Huaiyin Shipyard	Huaiyin, Jiangsu
Huangdao Shipyard, of Qingdao Ship Corp.	Qingdao, Shandong
Huanghai Shipyard	Rongcheng, Shandong
Hubei Shipyard	Wuhan, Hubei
Hubei Tongheng Shipbldg Ltd.	Ezhou, Hubei
<u>Hudong Shipyard</u>	Shanghai
Jiangbei Shipbldg Ltd	Huanggang, Hubei
Jiangdong Shipyard of Changjiang Shipping Corp.	Wuhu, Anhui
Jiangdu Shipyard	Jiangdu, Jiangsu
Jiangfeng Shipyard	Wuhu, Anhui
Jiangmen Shipyard	Jiangmen, Guangdong
<u>JiangNan Shipyard</u>	Shanghai
Jianglu Shipyard	Wuhu, Anhui
Jiangsu Ganghang Group Canal Corp. Ship Repairing Factory	Huaiyin, Jiangsu
Jiangsu Jinghui Ship Eng. Ltd.	Taicang, Jiangsu
Jiangxi Jiangxin Shipyard	Qingdao, Shandong
Jiangyang Shipbuilding Group Corp.	Yangzhou, Jiangsu
Jiangyin F.R.P Yacht Yard	Fuan, Fujian
Jiangyin Wuolong F.R.P. Craft Ltd	Fuan, Fujian
Jiangzhou Shipyard	Ruichang, Jiangxi
Jinling Shipyard of Changjiang National Shipping Corp.	Nanjing, Jiangsu
<u>Jinjiang Anchor Chain</u>	Jinjiang, Jiangsu
Jinjiang Fishing Vessel Shipyard, Jiangsu	Jinjiang, Jiangsu

Jingjiang Shipyard	Jinjiang, Jiangsu
<u>Jiuxin Shipyard</u>	Shanghai
Kailing Shipyard	Zhoushan,Zhejiang
Lianyungang Shipyard	Lianyungang,Jiangsu
Lingshan Shipyard	Qingdao, Shandong
Linhai Jiannan Shipbuilding &Repairing Ltd.	Qingdao, Shandong
Mawei Shipyard	Fuzhou, Fujian
Mingjiang Shipyard	Ningbo,Zhejiang
Nanchang Shipyard	Nanchang, Jiangxi
Nanghai Shipyard	Qingdao, Shandong
Nantong Fishing VesselShipyard	Nantong, Jiangsu
<u>Nantong Ocean Ship Eng. Co</u>	Nantong, Jiangsu
New China Shipyard	Guangzhou, Guangdong
Ningbo Daxie Development Zone Shipyard	Ningbo,Zhejiang
Ningbo Xinle Shipbuilding Ltd.	Qingdao, Shandong
Ningxunjie ShipbuildingCorporation(Ltd)	Ningbo,Zhejiang
Ningyu Ship Engineering Company	Qingdao, Shandong
Ocean Shipping RepairDockyard	Nantong, Jiangsu
Qingdao Shipyard	Qingdao, Shandong
Qingdao Yuandong Motor Craft Ltd	Fuan, Fujian
<u>Qing Shan Shipyard</u>	Wuhan, Hubei
<u>Qiuxin Shipyard</u>	Shanghai
Rongcheng Shipbldg Group Corp	Fuan, Fujian
Rudong County Shipyard	Rudong,Jiangsu
Sanxia Shipping Yard(Yingchang)	
Shandong Lunan Ship Group Corp.	Fuan, Fujian
<u>Shanghai Shipyard</u>	Shanghai
Shanghai Edward Shipbuilding Co., Ltd.	Shanghai
<u>Shanghai Fishing Vessel Shipyard</u>	Shanghai
Shanghai Hongxiangxin Shipyard	Shanghai
<u>Shanghai HuaRunDaDong Shipping Engineering Co., Ltd</u>	Shanghai
Shanghai LiFeng Shipyard	Shanghai
Shanghai Lixin Shipyard	Shanghai
Shanhaiguan Shipyard	Qinhuangdao,Hebei
Shangyou Shipyard	Fuzhou, Fujian
<u>Shenjia Shipyard</u>	Shanghai
Shenzhen Jianghui Ship Eng. Ltd.	Qingdao, Shandong

Shipyard of Yangzhou Shipping Company	Yangzhou, Jiangsu
Shunde Huaxing Shipyard	Qingdao, Shandong
Soonsan Shipyard (China)Co., LTD	Tongzhou, Fujian?
South China Shipyard	Guangzhou, Guangdong
Taicang Changjiang Shipyard	Taicang, Jiangsu
Tianjin Shipbuilding Company	Qingdao, Shandong
<u>Tianjin Xingang Shipyard</u>	Tianjin
Weihai Fishing Shipyard	Fuan, Fujian
Weihai Shipyard	Weihai, Shandong
Wuchang Shipyard	Wuhan, Hubei
<u>Wuhu Shipyard</u>	Wuhu, Anhui
Wuhu Dajiang Shipbuilding Ltd	
<u>Wuxi Shipyard</u>	Wuxi, Jiangsu
Wuxi Shipyard Zhangjiagang Sub-Yard	Zhangjiagang, Jiangsu
Wuzhou Shipyard	Wuzhou, Guangxi
Xiamen Shipyard	
Xiamen Fishery Shipbldg Ltd.	
Xijiang Shipyard	Liuzhou, Guangxi
Xingao Tech. Eng. Ltd.	Qingdao, Shandong
Xishan Hongsheng Shipyard	Xishan, Jiangsu
XinHua Shipyard, of Nanjing Jianghai Group Corp.	Nanjing, Jiangsu
Yangfan Shipbuilding Industry Corp.(Group), Zhoushan	
Yangzijiang Shipyard	Jiangyin, Jiangsu
Yantai Fishing Vessel Shipyard	
<u>Yantai-Raffles Shipyard</u>	Yantai, Shandong
Yichang Sanhuan Ship Repairing Ltd.	
Yichang Zhongjiao Ship Ltd	
Yinghui Nanfang shipbuilding Ltd, Fanyu	Qingdao, Shandong
Yizheng Shipyard	Yizheng, Jiangsu
Zhangjiagang Shipyard	Zhangjiagang, Jiangsu
Zhenjiang Jianbi Shipyard, of the Capital Steel Group	Fuan, Fujian
Zhejiang Leqing Changhong Shipyard	Leqing, Zhejiang
Zhejiang Qiligang Shipping Group Dongfang Ship Repairing Factory	Fuan, Fujian
Zhenjiang Shipyard	Zhenjiang, Jiangsu
Zhejiang Shipyard	Qingdao, Shandong
Zhejiang Zhoushan Dinghai Panzhi Shipyard	Zhoushan, Zhejiang
Zhoushan Fishing Corp. Fishing Vessel Factory	Fuan, Fujian

Zhoushan Wuyang Shipyard	Zhoushan, Zhejiang
Zhoushan Xingye Ltd. Shipyard	Fuan, Fujian
Zhufan Alu. Alloy Shipbuilding Ltd.	Zhuhai, Guangdong
ZhongHua Shipyard	Shanghai
Zhoushan Shipbuilding Industry Corp.	Zhoushan, Fujian
Zhuhai Haizhima yacht Factory	Qingdao, Shandong

Source: China Shipyards Directory (2002).

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