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Shipbuilding in China and its impacts on European shipbuilding industry

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1 This expertise is part of a wider report “European industries shaken up by industrial growth in China: What regulations are required for a sustainable economy?” European Metalworkers’ Federation, Brussels November 2006. The report comprises 3 sectors: Shipbuilding, Auto, Steel., see the EMF’s website:www.emf-fem.org/content/search?SearchText=China
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**I Shipbuilding in China**  
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Preface

The present discussion on the development of the Chinese shipbuilding industry and its consequences for world shipbuilding generally and the European shipbuilding in particular is stamped by contradicting appraisals and defective information. One is confronted with different appraisals, however, not only when one questions different actors (e.g., shipyards, banks or suppliers). Also within these groups the appraisals contradict partly considerably. A combination of divergent experiences of the actors, inadequate information and not least existing resentments compared with the "economic power of China" is decisively for it.

This contribution wants to deliver on the basis of expert's interviews as well as the evaluation of appropriate statistics and available literature some concrete information to win a more exact picture of the Chinese shipbuilding industry.

China is second as trade partner with the EU-25; and in 2005 the EU-25 has imported goods from China with a value of 158 billion EUROS. This has direct consequences for the sea-borne trade, and indirect impacts on global shipbuilding. In 2006 China is the third largest shipbuilder worldwide, and will become Number one in 2015 at the latest.

I Shipbuilding in China

1. The current stage of Chinese shipbuilding industry

The following graph indicates the quick rise of Far East and – in the last years – especially the Chinese shipbuilding industry. In the 1970s West European shipbuilding participated in the 1970’s boom in accordance with its global position at that time. In the period of recession in the 1980s, all shipbuilding regions worldwide suffered by a heavy decrease of orders. In the wake of the two global oil crisis about half of the shipyards worldwide disappeared from the map and thus employment had been halved (Stopford 2004). But in the succeeding recovery in the 1990’s and the boom of the global shipbuilding the European yards could not benefit. The real winner were the Far East yards:
Looking to the direct employment of the global shipbuilding industry, the following figures for China and South Korea did not mirror the exact reality (as f.e. the Korean figures partly comprises the marine supply/equipment industry), but could give an idea of the proportions:

**Number of direct employment in the shipbuilding industry, by regions, 2004**

*(Sources: IAW 2006, Suzuki 2006)*

<table>
<thead>
<tr>
<th>Region</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>287,702</td>
</tr>
<tr>
<td>South Korea</td>
<td>71,781</td>
</tr>
<tr>
<td>Europe (without Russia and Ukraine)</td>
<td>154,872</td>
</tr>
<tr>
<td>Japan</td>
<td>40,264</td>
</tr>
</tbody>
</table>

These figures should be treated very carefully, as in the different regions there are different understandings of employment. Furthermore there are different ratios between
direct employment and subcontractors; f.e. in South Korea is ratio is 1:4 , whereas in European shipbuilding industry (with the exception of cruisers) this ratio is 2:1.

The last five years:
China has appeared only in a relatively short time on the map of the world shipbuilding nations. Indeed, the industrial shipbuilding in China has his roots already in the 19-th century (cf. The European Community in 2004, 9pp). At that time the occupying powers began to build up shipbuilding capacities to be able to satisfy their transport needs. Up to this time the Chinese shipbuilding limited itself particularly to the construction of sail and fishing boats. Still today some of the today's most important shipyards in China are located on the locations of these historical shipyards.

The present development of the Chinese shipbuilding occurs after the same pattern as earlier in Japan or Korea. Japan used its shipbuilding industry in the 1950s and 1960s to rebuild the industrial structures of the country. Also Korea looked at the shipbuilding industry as a strategic core for the economic development of the country in the 1970s. China is now in the process of repeating these paths of development, supported by large government investments in the shipbuilding industry (Malhotra 2005).

After the 1950s all shipyards of China had been put under the control of the Ministry of Communication. Since 1982 China State Shipbuilding Corporation (CSSC) is responsible for the Chinese shipbuilding industry. In the 1990s the Chinese government felt constrained to initiate structural reforms in the shipbuilding sector on account of the size of the Chinese shipbuilding industry and the planned entry of China to the World Trade Organisation (WTO). Approximately more than 2,000 shipyards with more than 400,000 employees all together should be controlled no longer through one single conglomerate, because rising inefficiency appears as an increasing problem.

In the 1990s the biggest state transportation companies COSCO and SINOTRANS were also reconstructed. In the context of this reconstruction process many regions
and cities also received the control of their own transport infrastructure and smaller shipyards. The most important structural change in the Chinese shipbuilding industry in the past, however, was carried out in 1999. At that time the Chinese government decided to split CSSC into two organizations (CSSC and CSIC) operating independently from each other.

Since then CSSC controls primarily the shipyards to the south of Shanghai, while the newly founded China Shipbuilding Industry corporation (CSIC) is primarily responsible for the shipyards in the north. Partnerships and joint-ventures with foreign enterprises were expressly permitted subsequently to this re-organisation. This, above all, with the purpose to be able to attract the necessary investments and skills from abroad important for the progress of the Chinese shipbuilding industry.

_The competitions between the world regions:_

In 2005 China was already the third biggest shipbuilding nation worldwide – behind South Korea and Japan. Besides, the pace with which the Chinese shipbuilding industry has entered the group of the world’s most important shipbuilding countries is striking. While the Chinese shipyards delivered only 0.9 per cent of all worldwide built ships in 1985, the number has increased to 4.7 per cent only 15 years later. The development between 2000 and 2005 must be emphasized. In this period China has nearly succeeded in tripling its share of the world market. In the same period the share of the world market of the EU-25 halved itself and also the leading shipbuilding nations Korea and Japan had to accept – even if clearly lower – losses with their world market shares:
Shares of regions in the world shipbuilding production from 1975 to 2005 in per cent – on GT-base (Source: VSM 2006)

<table>
<thead>
<tr>
<th>Year</th>
<th>EU - 25</th>
<th>Other European Countries</th>
<th>Japan</th>
<th>South Korea</th>
<th>P.R. of China</th>
<th>Other Countries</th>
<th>World</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975</td>
<td>38.9</td>
<td>6.6</td>
<td>49.7</td>
<td>1.2</td>
<td>0.9</td>
<td>3.6</td>
<td>100</td>
</tr>
<tr>
<td>1980</td>
<td>26.8</td>
<td>9.3</td>
<td>46.5</td>
<td>4.0</td>
<td>2.3</td>
<td>13.6</td>
<td>100</td>
</tr>
<tr>
<td>1985</td>
<td>19.5</td>
<td>5.7</td>
<td>52.3</td>
<td>14.4</td>
<td>3.3</td>
<td>7.1</td>
<td>100</td>
</tr>
<tr>
<td>1990</td>
<td>18.3</td>
<td>7.5</td>
<td>43.0</td>
<td>21.8</td>
<td>4.7</td>
<td>7.3</td>
<td>100</td>
</tr>
<tr>
<td>1995</td>
<td>18.9</td>
<td>4.2</td>
<td>41.7</td>
<td>27.8</td>
<td>11.6</td>
<td>4.1</td>
<td>100</td>
</tr>
<tr>
<td>2000</td>
<td>12.4</td>
<td>2.4</td>
<td>38.2</td>
<td>38.9</td>
<td>3.3</td>
<td>3.3</td>
<td>100</td>
</tr>
<tr>
<td>2004</td>
<td>8.3</td>
<td>3.5</td>
<td>36.1</td>
<td>36.8</td>
<td>3.7</td>
<td>3.7</td>
<td>100</td>
</tr>
<tr>
<td>2005</td>
<td>6.9</td>
<td>2.8</td>
<td>35.0</td>
<td>37.7</td>
<td>3.9</td>
<td>3.9</td>
<td>100</td>
</tr>
</tbody>
</table>

As in the cases of steel production and the car industry also shipbuilding covers a huge number of different products which differ concerning their technological levels. A comparison between the shipbuilding regions China and Europe has to take this fact into consideration. Since only the total sum of the produced GT still states nothing about the ship types which are produced mainly in the respective regions. Basically it can be found out that the European shipbuilding industry is leading worldwide in the area of highly technological special ships, for example, cruise ships, RoPax-and RoRo ships, mega yachts or high tech naval ships. However, up to now the Chinese shipbuilding industry is concentrated upon the production of standard ships like container ships, oil tankers or bulkers. On the base of the new building orders in the period from 2002 to 2005 (measured in GT) it appears that China and Europe stand in strong competition, above all, in the segment of the container ships. In the viewed period 40.6 per cent of all new building orders in China and 23.1 per cent of all new building orders in Europe were dedicated to container ships. More
than 16 per cent of all new building orders in Europe, however, were dedicated to cruise ships and 11.6 per cent to RoRo cargo ships. Until now, in these both segments Chinese shipyards were not able to win appreciable orders.

**CESA and China - new building orders from the year 2002 to 2005 on GT base**

(Source: ISL/IAW)

<table>
<thead>
<tr>
<th>Ship Type</th>
<th>CESA 2002-2005 in GT</th>
<th>%</th>
<th>China 2002-2005 in GT</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container Vessels</td>
<td>9,254,965</td>
<td>40.6</td>
<td>8,502,083</td>
<td>23.1</td>
</tr>
<tr>
<td>Cruise Ships</td>
<td>3,702,191</td>
<td>16.3</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>RoRo Cargo</td>
<td>2,646,681</td>
<td>11.6</td>
<td>136,915</td>
<td>0.4</td>
</tr>
<tr>
<td>Oil Tanker</td>
<td>1,764,585</td>
<td>7.7</td>
<td>8,984,869</td>
<td>24.4</td>
</tr>
<tr>
<td>Others</td>
<td>1,683,944</td>
<td>7.4</td>
<td>84,892</td>
<td>0.2</td>
</tr>
<tr>
<td>General Cargo Vessel</td>
<td>1,213,951</td>
<td>5.3</td>
<td>1,360,436</td>
<td>3.7</td>
</tr>
<tr>
<td>Product Tanker</td>
<td>1,132,273</td>
<td>5.0</td>
<td>4,858,864</td>
<td>13.2</td>
</tr>
<tr>
<td>Gas Tanker</td>
<td>669,950</td>
<td>2.9</td>
<td>751,900</td>
<td>2.0</td>
</tr>
<tr>
<td>Car Carrier</td>
<td>308,182</td>
<td>1.4</td>
<td>414,000</td>
<td>1.1</td>
</tr>
<tr>
<td>Bulker</td>
<td>302,960</td>
<td>1.3</td>
<td>11,538,584</td>
<td>31.3</td>
</tr>
<tr>
<td>Chemical Tanker</td>
<td>93,304</td>
<td>0.4</td>
<td>195,809</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>22,772,986</strong></td>
<td>100.0</td>
<td><strong>36,828,352</strong></td>
<td>100.0</td>
</tr>
</tbody>
</table>

The concentration of the European shipbuilding industry on the special shipbuilding (incl.containiership building) is also reflected in the comparison of the generated turnovers of the world shipbuilding nations in 2004. It appears that Europe has produced in 2004 clearly less cgt tonnage than, for example, Japan or South Korea. Anyhow the turnover achieved in Europe thereby was clearly higher than in Japan, South Korea or China.
Turnover and tonnage completed of main shipbuilding areas in 2004 (Source: CESA)

The different levels of turnover in the word regions correspond with the different prices for ship types, that means for example, that the European turnover is 10 per cent higher than the turnover in South Korea (though the completions in CESA countries are roughly half of those in S. Korea), as European shipbuilding industry concentrates of higher value-added ships with higher prices:
2. Structure of the Chinese shipbuilding industry

Until today there exists no dependable information about the number of the Chinese shipyards. Nowadays the number of shipyards in China is estimated at approximately 2,000 – 3,000. Nevertheless, only approximately 600 of these shipyards are able to build ocean going vessels. Classification societies assume from the fact that at most 10 per cent of these shipyards are able to produce for the export (Germanischer Lloyd 2005, 15). As a result of the future consolidation process of the Chinese shipbuilding industry (also by mergers and bankruptcies) western experts expect that the number of the Chinese shipyards, competitive at the world market, will decrease in the next 10-15 years. De Norske Veritas forecasts that in ten years only maximum of 15 Chinese shipyards will exist which compete at the world market (Schmidt 2005, 9).
In spite of the relatively high number of Chinese shipyards the Chinese shipbuilding industry is dominated by the two big groups CSSC and CSIC. Both groups are concentrating more than 60% of the Chinese shipbuilding production with more than 70% of all new building orders placed in China. Due to the outstanding position of these two state owned shipyard groups they should be outlined in the following briefly.

China State Shipbuilding Corporation (CSSC)

CSSC was founded originally in 1982 with the purpose to organise the Chinese shipbuilding sector afore controlled by the Chinese communication ministry. Since the splitting of CSSC in the two groups CSSC and CSIC in 1999, CSSC is responsible for the shipyards located on the east coast of the Yangtze delta and in the southern regions of China.

In 2004 CSSC was already the fourth largest shipbuilding corporation in the world:

**World Ranking in 2004 (Source: Suzuki 2006, Table 3(2))**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company name</th>
<th>Construction quantity (in million dwt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hyundai Heavy Industries</td>
<td>6.93</td>
</tr>
<tr>
<td>2</td>
<td>Samsung Heavy Industries</td>
<td>5.36</td>
</tr>
<tr>
<td>3</td>
<td>Daewoo Shipbuilding</td>
<td>4.30</td>
</tr>
<tr>
<td>4</td>
<td>CSSC</td>
<td>3.57</td>
</tr>
</tbody>
</table>

In 2010 the target is a construction quantity of 10 mio dwt (third in the world) and in 2015 15 mio dwt (first).

All together the group CSSC directly employs more than 95,000 people. The enterprises of the groups CSSC are concentrated in the area around Shanghai, Guangzhou and other cities in the provinces of Jianxi and Anhui. The most important CSSC shipyards are:

- Chengxi Shipyards
- Guangzhou Shipyards International Co. Ltd
Guangzhou Wenchong
Hudong Zhonhua Shipbuilding (Group) Co. Ltd
Jiangnan Shipbuilding (Group) Ltd
Jiangzhou Shipyard
Shanghai Shipyard
Shanghai Waigaoqiao Shipbuilding Co. Ltd
Tianjin Xingang Shipyard
Wuhu Xinlian Shipyard Ltd.

A total of 25 big and middle-sized shipyards, 57 maritime supply enterprises, 36 research institutes, three universities and four training centers belong to CSSC. It appears that CSSC is a vertically very diversified corporation. The shipyards of the group co-operate mostly with maritime supply companies and research institutes belonging to the group.

Since 2003 the China Shipbuilding Trade Co. Ltd. (CSTC) is responsible for the marketing and the sales of ships for the export of CSSC. The single enterprises of the CSSC group have different shareholders but CSSC itself holds, nevertheless, always the biggest share in the single enterprises. The other shareholders are mostly regional institutions or other Chinese enterprises as for example the Chinese steel producer Baosteel.

China Shipbuilding Industry Corporation (CSIC)
After the splitting of the former CSSC in 1999 the responsibility for more than 48 industrial enterprises and 28 research institutes was transferred to the CSIC. CSIC companies are located in more than 20 provinces in the northern part of China, especially in the bay of Bohai. All together approximately 160,000 people are directly employed by CSIC. The most important shipyards of CSIC are:

- Bohai Shipbuilding Heavy Industry Co. Ltd
- Dalian Shipyard Co. Ltd
- Dalian New Shipbuilding Heavy Industries Co. Ltd
- Qingdao Beihai Shipbuilding Heavy Industry Co. Ltd
- Shanhaiguan Shipyard
As well as in the case of CSSC the marketing and export activities of CSIC were transferred in 2003 to the new founded China Shipbuilding und Offshore International Co. (CSOC). The Dalian New Shipyards belonging to the CSIC group is the first state-controlled Chinese shipyard which was able to win orders for VLCCs (Very Large Crude Carrier). As well as CSSC, CSIC is able to build more than 100 different ship types. This encloses naval as well as merchant ships.

Because the group also owns enterprises which produce not only especially for the maritime sector, CSIC also works in the sectors of airplane construction, metallurgy and energy. Analogously to CSSC, shipyards belonging to the CSIC group, have different shareholders. In most cases the CSIC owns the majority, while the remaining shares are held either by banks, individuals or asset management institutions.

Others
Beside CSSC and CSIC a huge number of other shipyards exist in China. Most of them as for example the Changjiang National Shipping Group or the Fujian Shipbuilding Industry Group Corporation are furthermore under state control, directly or more indirectly. There are still a not exactly verifiable number of shipyards which are in private property. According to estimations of the European Community approximately 10 smaller and middle shipyards were in 2004 in private ownership (European Community in 2004, 12).
The following ranking shows the importance of the single Chinese shipyards, in relation to their orderbooks, specified by the type of ship and the origin of orders (domestic/foreign shipowners):
# Orderbook of Chinese Shipyards (May 2006; Source: China Intelligence Monthly)

<table>
<thead>
<tr>
<th>Shipyard</th>
<th>Tankers</th>
<th>Gas Carriers</th>
<th>Off-shore</th>
<th>Bulkers</th>
<th>Container-ships</th>
<th>Other Dry</th>
<th>TOTAL</th>
<th>% Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalian Shipbld. Ind.</td>
<td>1,610</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,214</td>
<td>-</td>
<td>2,824</td>
<td>14.0%</td>
</tr>
<tr>
<td>Waigaoqiao S/Y</td>
<td>588</td>
<td>255</td>
<td>1,019</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,861</td>
<td>9.2%</td>
</tr>
<tr>
<td>Hudong Zhonghua</td>
<td>50</td>
<td>368</td>
<td>-</td>
<td>456</td>
<td>428</td>
<td>119</td>
<td>1,421</td>
<td>7.0%</td>
</tr>
<tr>
<td>New Century S/Y</td>
<td>1,221</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>117</td>
<td>-</td>
<td>1,338</td>
<td>6.6%</td>
</tr>
<tr>
<td>Bohai Shipbld.</td>
<td>627</td>
<td>12</td>
<td>-</td>
<td>270</td>
<td>-</td>
<td>-</td>
<td>909</td>
<td>4.5%</td>
</tr>
<tr>
<td>Shanghai Chengxi</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>341</td>
<td>482</td>
<td>-</td>
<td>823</td>
<td>4.1%</td>
</tr>
<tr>
<td>Nantong S.B.</td>
<td>286</td>
<td>-</td>
<td>-</td>
<td>236</td>
<td>284</td>
<td>-</td>
<td>806</td>
<td>4.0%</td>
</tr>
<tr>
<td>Jiangnan Changxing</td>
<td>491</td>
<td>-</td>
<td>-</td>
<td>274</td>
<td>-</td>
<td>-</td>
<td>765</td>
<td>3.8%</td>
</tr>
<tr>
<td>Guangzhou Shpyd</td>
<td>763</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>763</td>
<td>-</td>
<td>1,526</td>
<td>7.6%</td>
</tr>
<tr>
<td>Jiangsu S/Yard</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>599</td>
<td>75</td>
<td>674</td>
<td>3.3%</td>
</tr>
<tr>
<td>Jiangnan S/Yard</td>
<td>161</td>
<td>11</td>
<td>-</td>
<td>460</td>
<td>-</td>
<td>-</td>
<td>632</td>
<td>3.1%</td>
</tr>
<tr>
<td>Jinling Shipyd.</td>
<td>327</td>
<td>-</td>
<td>-</td>
<td>259</td>
<td>25</td>
<td>-</td>
<td>611</td>
<td>3.0%</td>
</tr>
<tr>
<td>Dayang S.B.</td>
<td>-</td>
<td>59</td>
<td>203</td>
<td>226</td>
<td>79</td>
<td>-</td>
<td>567</td>
<td>2.8%</td>
</tr>
<tr>
<td>Zhejiang S.B.</td>
<td>9</td>
<td>153</td>
<td>123</td>
<td>226</td>
<td>-</td>
<td>-</td>
<td>511</td>
<td>2.5%</td>
</tr>
<tr>
<td>Qingshan S.Y.</td>
<td>202</td>
<td>-</td>
<td>-</td>
<td>182</td>
<td>96</td>
<td>48</td>
<td>520</td>
<td>2.6%</td>
</tr>
<tr>
<td>Guangzhou Wenchong</td>
<td>-</td>
<td>8</td>
<td>132</td>
<td>123</td>
<td>-</td>
<td>23</td>
<td>361</td>
<td>1.8%</td>
</tr>
<tr>
<td>Xingang S.Y.</td>
<td>-</td>
<td>41</td>
<td>132</td>
<td>-</td>
<td>171</td>
<td>-</td>
<td>344</td>
<td>1.7%</td>
</tr>
<tr>
<td>Zhejiang Yangfan</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>328</td>
<td>-</td>
<td>328</td>
<td>328</td>
<td>1.6%</td>
</tr>
<tr>
<td>Kousan S.B.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>46</td>
<td>195</td>
<td>72</td>
<td>312</td>
<td>1.5%</td>
</tr>
<tr>
<td>Mawei S.B.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>250</td>
<td>47</td>
<td>298</td>
<td>1.5%</td>
</tr>
<tr>
<td>Xiamen S.B.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>131</td>
<td>146</td>
<td>277</td>
<td>414</td>
<td>2.0%</td>
</tr>
<tr>
<td>Jiangsu Eastern</td>
<td>-</td>
<td>37</td>
<td>-</td>
<td>171</td>
<td>51</td>
<td>259</td>
<td>312</td>
<td>1.5%</td>
</tr>
<tr>
<td>Jiangdu Dadong</td>
<td>157</td>
<td>-</td>
<td>35</td>
<td>-</td>
<td>-</td>
<td>192</td>
<td>0.9%</td>
<td></td>
</tr>
<tr>
<td>Hantong Shipyard</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>166</td>
<td>-</td>
<td>166</td>
<td>332</td>
<td>1.6%</td>
</tr>
<tr>
<td>Weihai S/yard</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>134</td>
<td>6</td>
<td>147</td>
<td>281</td>
<td>1.4%</td>
</tr>
<tr>
<td>Qingdao Hyundai</td>
<td>83</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>23</td>
<td>113</td>
<td>186</td>
<td>0.9%</td>
</tr>
<tr>
<td>Others</td>
<td>788</td>
<td>83</td>
<td>413</td>
<td>224</td>
<td>264</td>
<td>643</td>
<td>2,414</td>
<td>12.0%</td>
</tr>
<tr>
<td>TOTAL CGT</td>
<td>7,372</td>
<td>531</td>
<td>1,116</td>
<td>3,734</td>
<td>5,970</td>
<td>1,476</td>
<td>20,199</td>
<td>100%</td>
</tr>
<tr>
<td>No. Vessels</td>
<td>407</td>
<td>21</td>
<td>123</td>
<td>195</td>
<td>351</td>
<td>157</td>
<td>1,254</td>
<td></td>
</tr>
</tbody>
</table>

### DOMESTIC OWNERS

<table>
<thead>
<tr>
<th>Shipyard</th>
<th>Tankers</th>
<th>Gas Carriers</th>
<th>Off-shore</th>
<th>Bulkers</th>
<th>Container-ships</th>
<th>Other Dry</th>
<th>TOTAL</th>
<th>% Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total CGT</td>
<td>1,598</td>
<td>380</td>
<td>401</td>
<td>576</td>
<td>1,269</td>
<td>42</td>
<td>4,265</td>
<td>21.1%</td>
</tr>
<tr>
<td>No. Vessels</td>
<td>78</td>
<td>7</td>
<td>6</td>
<td>27</td>
<td>42</td>
<td>8</td>
<td>166</td>
<td>13.4%</td>
</tr>
<tr>
<td>% Domestic (of cgt)</td>
<td>21.7%</td>
<td>71.4%</td>
<td>35.9%</td>
<td>15.4%</td>
<td>21.3%</td>
<td>2.9%</td>
<td>21.1%</td>
<td></td>
</tr>
</tbody>
</table>

### FOREIGN OWNERS

<table>
<thead>
<tr>
<th>Shipyard</th>
<th>Tankers</th>
<th>Gas Carriers</th>
<th>Off-shore</th>
<th>Bulkers</th>
<th>Container-ships</th>
<th>Other Dry</th>
<th>TOTAL</th>
<th>% Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total CGT</td>
<td>5,774</td>
<td>152</td>
<td>716</td>
<td>3,157</td>
<td>4,700</td>
<td>1,433</td>
<td>15,933</td>
<td>78.9%</td>
</tr>
<tr>
<td>No. Vessels</td>
<td>329</td>
<td>14</td>
<td>117</td>
<td>168</td>
<td>309</td>
<td>149</td>
<td>1,086</td>
<td>86.6%</td>
</tr>
<tr>
<td>% Foreign (of cgt)</td>
<td>78.3%</td>
<td>28.6%</td>
<td>64.1%</td>
<td>84.6%</td>
<td>78.7%</td>
<td>97.1%</td>
<td>78.9%</td>
<td></td>
</tr>
</tbody>
</table>
3. Forecast

Within the scope of the 5 year plans for the economic development decisive defaults were formulated for the Chinese shipbuilding industry. The State Commission of Science, Technology and Industry for National Defence has set targets for shipbuilding output at 10 million dwt in 2005 and 24 million dwt by 2015, estimated to represent 16 per cent in 2005 and 35 per cent in 2015 respectively of world shipbuilding output. To reach these goals seems to be realistic if one looks the present shipbuilding capacity developments.

The OECD has provided a prediction for the period from 2000 to 2007 concerning the growth rates of the production capacities in world shipbuilding. Only during these seven years China will have raised its shipbuilding capacities by 52 per cent— the biggest increase by far worldwide:

**Proportional change of the world shipbuilding capacities (cgt) from 2000 to 2007 (Source: OECD in 2004 b, 16, based on Lloyd’s Register Fairplay; own**

![Graph showing proportional change of world shipbuilding capacities from 2000 to 2007](image)

The South-Korean shipyards increased their production capacities about nearly 18 per cent in this period, while the capacities of the Japanese shipyards will grow about
8 per cent during the same period of time. The shipbuilding capacities in the European CESA member countries increase with 8.5 per cent. Indeed, CESA’s growth rate still lies above the value of Japan, nevertheless, South Korea and China stand out with clearly higher growth rates.

Indeed, the OECD forecast has examined only the period from 2000 to 2007. Nevertheless, in view of the announced investments in new shipyards it must be assumed that the increase of Chinese shipbuilding capacities will also proceed with the same pace during the next years. The existing shipyards will expand their capacities on locations while new docks and facilities will be constructed in the designated areas. The two state-controlled groups CSSC and CSIC are in the forefront of this expansion.

In order to reach the target to become no. 1 of the world’s shipbuilders, CSSC is expanding its yards:

**State of Facility Expansion at CSSC Member Shipyards (Source: Suzuki 2006 Table 3(3)**

<table>
<thead>
<tr>
<th>Shipyard Name</th>
<th>Facility expansion plan</th>
<th>Completion date</th>
<th>Planned capacity in million dwt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shanghai Waigaoqiao Shipbuilding Co. Ltd</td>
<td>Expansion of capacity in two-phase construction</td>
<td>2008</td>
<td>2.60</td>
</tr>
<tr>
<td>Chang Xing Shipyard</td>
<td>Merger of Hudong Shipyard and Jiangnan Shipyard</td>
<td>2015</td>
<td>8</td>
</tr>
<tr>
<td>Zhongming Shipyard</td>
<td>Transfer of Shanghai Shipyard</td>
<td>2010</td>
<td>1.5</td>
</tr>
<tr>
<td>Nansah Longxue Shipyard</td>
<td>Merger of Guangzhou Wenchong and Guangzhou Shipyard International Co. Ltd</td>
<td>2008</td>
<td>3</td>
</tr>
</tbody>
</table>

15.10 (Total)
Similar to the expansion of CSSC, the CSIC Member shipyards will expand too and is planning, to be equal to its “taller” brother CSSC:

**State of Facility Expansion at CSIC Member Shipyards (Source: Suzuki 2006)**

<table>
<thead>
<tr>
<th>Shipyard name</th>
<th>Facility expansion plan</th>
<th>Completion date</th>
<th>Planned capacity in mio dwt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalian New Shipyard</td>
<td>New VLCC dock expansion</td>
<td>2009</td>
<td>3.30</td>
</tr>
<tr>
<td>Dalian Heavy Industries</td>
<td>New VLCC dock expansion</td>
<td>2010</td>
<td>1.50</td>
</tr>
<tr>
<td>Bohai Heavy Industries</td>
<td>New VLCC dock expansion</td>
<td>2007</td>
<td>1.50</td>
</tr>
<tr>
<td>Haixi Wan Shipyard</td>
<td>Transfer of Qingdao Beihai Shipyard</td>
<td>2015</td>
<td>4.68</td>
</tr>
<tr>
<td>Qinhuangdao Shipyard</td>
<td>Shanghaiguan Shipyard to construct an joint venture shipyard</td>
<td>2010</td>
<td>1.50</td>
</tr>
<tr>
<td>Tianjin Binhai Shipyard</td>
<td>Transfer of Xingang Shipyard</td>
<td>2011</td>
<td>3</td>
</tr>
</tbody>
</table>

CSSC has set its expansion targets very high, aiming to become the 5th largest shipbuilding group in the world by 2005, 3rd largest by 2010 and the largest by 2015. Embedded in this process, it will increase its shipbuilding capacity from the 3 million dwt tons in 2005 to 15.10 million dwt tons in 2015. In agreement with the Shanghai municipality, 8 kilometres of Changxing Island facing the mouth of the Huangpu river on the Yangtze Delta will be developed to become the largest shipbuilding site in the world at a cost of approximately US$3.5 billion and to be completed around 2010. Funds will be raised mainly through loans and investments in the form of bonds and rights issues. Additional funds will be raised from the sale of land in existing inner-city
facilities. The first stage of the development will include the completion of three docks by 2007. This site will take over the orderbook of Jiangnan Shipyard whose current facilities in Shanghai will be offered for development. Part of the facilities in the second stage of development will be used to replace the Hudong Zhonghua facilities, also in Shanghai. By 2015, it is expected that the completed facilities will be able to deliver 8 million dwt tons of ships a year. The facilities, offering seven large building docks, are expected to attract high value orders such as LNG carriers, cruise ships, ferries and offshore structures as well as very large crude oil and bulk carriers.

In the south of China, the CSSC group is planning a new site on Longxue Island near Guangzhou. With an initial investment of US$543.4 million, the yard is expected to be completed by 2008 and will have a shipbuilding capacity of 2.0 million dwt tons annually.

In the north of China, CSIC plans to expand existing facilities in Dalian and Bohai Bay Shipbuilding capacities.

On the marine engine field, special support is given in the production of low speed diesel engines only to existing manufacturers in Dalian, Shanghai and Yichang on the Yangtze River.

Concerning the future development of the Chinese shipbuilding it is above all emphasised that the up to now underdeveloped ancillary structure is the main problem in China. Compared to the main competitors at the world shipbuilding market most analysts agree to the fact that the Chinese shipbuilding industry dates back from approximately five to eight years behind the Korean and the Japanese shipbuilding industry.

Up to now the Chinese shipyards still benefit from the low labour costs, but this advantage could be reduced in the near future: “The steadily rising prices for steel, coal, electricity and transport are dogging the shipbuilding industry. With an average gross profit of less than 10% for shipbuilding in China rising costs will inevitably threaten the profitability of the county’s shipbuilding enterprises” (Yundan 2005). Indeed, today the advantage of low labour costs is already not as big as it is often subordinated. This advantage is partly offset by the number of workers needed to
perform tasks already automated in other countries, and of importing steel and parts (Malhotra 2005).

To increase the productivity, some shipyards have gone over to reorganize the working organization as well as the wage structures. Thus in the Dalian New Shipyard wages depend of the quality of the work. The president of the Dalian New Shipyard (Mr. Sun Bo) said: „It’s difficult to control the workers if they get payed whether they work or not” (Brewer 2006). Beside the linking of wage and working quality the workers were grouped in the shipyard also in different departments in teams which compete with each other.

While the most important shipyard groups, CSSC and CSIC, have relative clear developing strategies, analysts assume from that, above all, small and mid-size shipyards will get difficulties in the near future. This is due to the fact, that these shipyards dispose of no own R&D capacities: “For these yards, their only advantage is cheap labour and current strong demand for shipbuilding capacity. In a weaker market environment with strengthened competition, these shipyards will find it hard to survive” (Schmidt 2005, 9).

Provided, the Chinese shipbuilding industry will also develop dynamically during the next years, this will strongly change the structure of Chinese shipbuilding. Furthermore learning curve effects and economies of scale can be expected. The increasing competition within the Chinese shipbuilding industry will force changes in labour productivity. Underlining the fact that many yards are overstaffed, the upgrading of the yards with new technologies and organizational changes will improve productivity, but in some cases significant job losses will occur. For example the Hudong shipyard employees approximately 17,000 workers (11,000 workers with beige clothes and 6,000 sub-contracters with blue clothes). According to information by the EU Commission almost all of the beige dressed workers are surplus staff, while the main work is done by the sub-contractors. Today the yards are not allowed to lay off the surplus workers, but this could change in the future – confronting the government with huge social problems.

Especially the Korean and Japanese’s FDI in Chinese Shipbuilding could lead in the face of overcapacities to two different scenarios: Either the building capacities in the FDI countries of origin could be reduced, which could produce political tensions in the countries concerned. Or the foreign companies would decide to close down their
yards in China. In this case the competitive situation of the mother companies would deteriorate, as they now could not exploit the low Chinese labour costs.

4. Chinese policy for the shipbuilding sector

The development of the Chinese shipbuilding is often compared to the development of the shipbuilding industry in South Korea. But the conditions for both processes of development differ considerably. The South-Korean shipbuilding industry was aimed from the outset to produce for export. In contrary, the shipbuilding industry in China was developed to strategic reasons as it was the case, for example, in the former Soviet Union. The substantial construction of shipbuilding capacities in China is founded to enable China to manage the sea transport independently and with own transport capacities. Above all, the need for raw materials for domestic manufacturing, the need for food for the Chinese population and the exports by the Chinese economy should be covered by ships built in China. This is another difference between China and South Korea in this respect: South Korea never needed a domestic fleet of merchant ships for its exports or for importing goods.

Outspoken target of the Chinese administration is to develop China as the leading world shipbuilding nation until 2015 at the latest:

**Long-Term Plan of the Chinese Government (State Commission of Science, Technology and Industry for National Defense) (units: 10,000 dwt; per cent)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Construction Quantity</th>
<th>Share</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>800</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>1,000</td>
<td>16</td>
<td>2005 actual performance: 12 mio dwt, 18 % share</td>
</tr>
<tr>
<td>2010</td>
<td>Shipbuilding power</td>
<td>25</td>
<td>Sharing the markets in Japan, S. Korea and China</td>
</tr>
<tr>
<td>2015</td>
<td>2,400</td>
<td>35</td>
<td>China acquires the number one share</td>
</tr>
<tr>
<td>2020</td>
<td>Shipbuilding Superpower</td>
<td></td>
<td>China achieves world standards in shipbuilding technology as well and becomes the world leader in both, name and reality.</td>
</tr>
</tbody>
</table>
To reach this target, the Chinese government has resolved to develop three regional shipbuilding centres in China: the Bohai Bay in the north, the Yangtze Delta in the centre of the coast and Pearl River Mouth in the south. In these three regions the existing shipbuilding capacities should be modernized and new shipyards be built. Locations beyond these main regions should not be promoted in the future. The shipyards in the officially mentioned regions are asked to increase their productivity by improved management processes and raised qualification of the employees. The lowering of the production costs is declared as the main target of these measures.

Facing this ambitious industrial policy the Chinese government has put on a catalogue of industrial-political measures which should support the shipyards:

- The income tax will remit to the shipbuilding enterprises under certain circumstances. If the shipyards have done investments before 2010 in China, they can be exempt from the income tax for maximum five years after the investment. Nevertheless, this tax exemption refers only to the profit which could be generated by the investment. The tax exemption may amount to maximum 5 per cent of the effected investment.

- Export tax rebates: For the construction of ships for the export the Chinese shipyards can assert further discounts with the export tax. Indeed, a list was provided in 2004 for products which are not released any more from the export tax, ships for the export were expressly excluded from this regulation, however.

- Investment funding reforms: Shipbuilding companies are allowed to raise capital for plant and site development from public issues or corporate bond sales. "Other forms of fundraising will be encouraged through ship leasing companies, very similar to the Japanese ‘shikumisen’ system where trading houses were instrumental in the development of the Japanese shipbuilding industry with finance and charter arrangements. These companies will be controlled by the Chinese authorities, initially attached to large existing corporations already involved in the shipbuilding, transportations or energy sectors (...) but will be encouraged to attract foreign investments. Such companies will order ships for leasing to domestic or foreign operators and will enjoy preferential shipbuilding loan terms and insurance guarantees."
Moreover, such leasing companies will enjoy a preferential business tax regime from their start, being exempt from profit tax for the first five years since their establishment and paying only 1 per cent of their net income as tax between years 6 and 10 of their operation” (European Community 2004, 16). The shipyards themselves will be able to finance their activities through government revolving laps, occurred on the work in progress, as assessed by government financial inspectors.

- Stabilisation of material costs: To secure a steady flow of steel supplies for the shipbuilding industry, the government plans to deliver 80 per cent of the required steel by domestic steel producers. In order to reach this target, the government has promised to subsidy the technological modernization of the steel companies.

- Last but not least the government in Beijing aims to be able to deliver at the latest in 2010 80 per cent of all shipbuilding parts by domestic marine suppliers/equipment manufacturers. Therefore, it was allowed to Chinese maritime suppliers to create joint-ventures with foreign partners. In addition, it is also allowed to foreign maritime suppliers to build up own production plants in China which can be to 100 per cent in foreign ownership.

- Foreign investors in new shipbuilding and marine engine manufacturing units are only allowed to own up to 49 per cent of such ventures, with the Chinese partners retaining the majority. Such ventures must also be equipped with shipbuilding technology support by establishing their own R&D units.

In particular after China had entered the WTO in 2001 and in view of these supporting measures the question is whether these instruments agree with the WTO-rules on subsidies. Due to the lack of information this question cannot be answered finally. Nevertheless, the EU Commission doubts are expressed whether all these instruments do agree with the WTO-rules. These doubts seem reasonable, because an unpublished study from 2005 about the financing methods in the Chinese shipbuilding enumerates twelve different financial support measures for Chinese shipyards whose conformity with the WTO rules is questionable in many cases.

According to opinion of experts it is absolutely realistic if the Chinese government declares to be the biggest (merchant) shipbuilding nation of the world until 2015.
Firstly shipbuilding industry is very much related with other sectors like steel industry etc. This gives a cluster effect.

Secondly the Chinese economy develops increasingly to an export economy and export mostly runs through sea born trade. China likes to participate in this boom. The state loans to control the economy (growth rates yearly at 9.8 per cent in 2005 and in the first half-year in 2006 even 10.9%) are paid from the export profits. Additional to this source the profits made by state owned enterprises (SOE), the half-state and private enterprises are re-invested by the enterprises even again – in China there is nowadays a high self-financing rate which is only comparable with the self-financing rate of the West German economy in the 1950s after ending of the Second World War.

China is, at least, the biggest foreign currency owner in the world. Of course there is since 2004 the danger of economic overheating (esp. in the construction and car sector). Consequently the state limited the credits and raised special taxes. But this state policy is thwarted by the high self-financing rate Chinese (privately and state owned) companies which re-invest their high profits unimpressed from the cooling-down policy of the government. And foreign enterprises get anyway no state loans and can invest unhindered.

5. Four small case studies

In the following chapter some selected Chinese shipyards should be briefly introduced. Drawing from these “case studies” some general statements on certain points (wages, working relations, trade unions, working security etc.) will be made. The information is descended partly from our interviews in Europe, partly they are taken from secondary sources (IG Metall 2004, Simon Clarke 2003).

- **Dalian New Heavy Industry Shipbuilding Co.**
  The company was originally set up by the Russians in 1898, taken over by the Japanese in 1905 and became a state-owned-enterprise (SOE) after liberation. Restructured in the 1980s reforms, and it had 17,000 employees in 1984. In 1990 the old enterprise was divided, the old one retaining 10,000 employees with 4,500 moving to the new one. Under the reforms management got more autonomy and was under pressure to improve quality. This yard became the main export base of the China Shipbuilding Industry Corporation (CSIC), the second largest shipbuilding
group after the China State Shipbuilding Corporation (CSSC). In 1994 it did not appear to have confronted over-manning too stringently. More than 20 per cent of employees were on contracts, mostly newcomers since 1984. Payment was based on post, skill, efficiency, years of service plus bonus. The yard is paying good wages. The new shipyard was established because there was not enough space to build large ships at the old site. It is currently the biggest shipyard in China and part of China Shipbuilding Industry Corporation. It used to be 100 per cent SOE but was restructured in 2001. It builds 100-300,000 tonne vessels. It all looks highly mechanised and automated. There have obviously been huge investments in building and equipping the new shipyard. In August 2001 there 400 engineers working on design & research, it was ISO 9000 certified with two production lines (one body line and one outfitting line).
The old and the new shipyard are independent companies. The old shipyard is still doing all right, so have not had many lay-offs.
The new yard employed in 2002 4,700 directly plus 4,000 - 5,000 through subcontractors. They are served by about 200 small and large supplier enterprises. They need a lot of labour so they can provide jobs. As an SOE it has strong management, party and trade union systems. The CEO is responsible for production and marketing as the heart of management. The party is in charge for supervision of production and management. The union system represents the interests of labour and the coordination of production and business. Even though they have three systems, they have a common interest: the development of shipbuilding. Although it is an SOE, each worker knows that they have to work hard for income because they know that their income depends on the development of the shipyard, so workers and managers have the same aim. Because they have the same aim, they work together smoothly and the details of the contract between the enterprise and the worker are all done in public, according to particular standards.
Their competitive edge is

- New product development
- Lower labour cost
- Ownership reform helps to promote the performance of the company.

The labour cost is about 15% of the cost of a ship, which is only half of Korea and Japan, so the wage level in the company is a little above the city average.
In the new company, especially after 1996, when production increased from 200,000 ton to 600,000 ton, the labour force was insufficient so they began to sub-contract. It is a commercial contract and therefore wages of their workers are paid by the sub-contractors. No workers were displaced by sub-contractors, it was only to accommodate increases in production.

There are about 2,000 first-line production workers. Their average wage is 1,800-2,000 RMB (180 – 200 Euros). The basic wage is about 1,200 RMB plus a seniority payment of 8 RMB per year of service, plus 200 RMB for skill level, plus overtime, plus piece rate bonus. If they do not make their targets, they lose their piecework bonuses. Workers are paid by piece rate system. They reformed the wage structure in December 2001, giving more to technicians and key personnel. Because it is an SOE, the wage structure reform was based on models recommended by the government: a post-based wage system.

The Party Secretary and Trade Union Chair are both members of the Supervisory Board.

They belong to the Dalian and the provincial Employers’ Confederation, but not to the national CEC (All-Chinese Employers’ Association).

At the corporation level the trade union has six departments and two offices. They do their work under the trade union law. The total trade union membership is 5,997, which includes workers in a couple of subsidiaries. They have a total of 28 full-time officers, 14 at the corporation level, 14 at department levels. Shop and team levels are not full-timers.

Basically work of the trade union officers is divided into two categories:

- Protect workers’ rights, and motivating workers to work hard in the enterprise
- Help settle labour disputes.

The Chair of Trade Union (TU) has been TU official for 29 years. Previously he was the head of department of women’s issues at the old factory. He was originally an ordinary worker.

In an SOE the trade union chair is not directly elected. Candidates are recommended by the party organization and approved by the corporation, to check whether the candidate is qualified, they {presumably the Party} listen to the views of insiders and select one to go to the Workers Representative Congress and by a secret ballot the final selection is made.
The role of the Party is to ensure, guarantee and supervise operation of the enterprise, while the role of TU is to motivate workers to work hard for the enterprise and present workers' opinions to the party and the management. The TU represents the workers in signing and implementing the collective contract. In the company contract (CC) all aspects related to the life and work of workers are included. The CC is published in the factory newspaper: It is signed by the General Director and the Trade Union leader.

Wage agreements will be “negotiated” every year, whereas CCs every 3 – 5 years. Every year there is a joint review of implementation of CC and they might amend it. They negotiate wages every year.

Unions gather opinions of workers through Workers Representative Committee (WRC) twice a year to discuss major issues. They also have a collective contract supervision group which reports to the trade union and the WRC. They send the drafts to individual workers and comments come back from team leaders. There are very few disputes between workers and management.

The main problems facing the trade union in the next five years are that, due to ownership reform, the company is now regulated by the Corporate Law and not by Enterprise Law. The Corporate Law has different provisions on the WRC. Under the Enterprise Law the WRC has a right to determine management decision. Under Corporate Law, the company is obliged just to listen to views of workers through WRC. There is a problem with this and it is being discussed in Beijing and they are going to revise the Corporate Law.

With Chinese entry into WTO they face the challenge of improving workers’ professional quality.

- Shanghai Waigaoqiao Shipbuilding

The majority of the shipyard’s shares are owned by the CSSC group. The yard conceives as a great shipyard according to Korean model, and is located in the Pudong New District close to Shanghai on the Yangtze riverbank opposite to the Waigaoqiao foreign trade zone.

The shipyard was founded within the 9-th five-year plan (1996 – 2000) by the All-Chinese Council of State as a " priority industrial project ". Built in two construction
steps, it had in the end of 2004 3,900 people. The shipyard is designated to build all kinds of big and also high tech ships, for example, 300,000 TDW VLCC, 170,000 TDW Capesize Bulkcarrier; 160,000 TDW Suezmax and 100,000 tankers TDW Aframax. The annual capacity amounts to 1.8 Mil. TDW on a surface of 2.1 Mio. square metres in a 1,500-metre-long bank stripe. Till 2010 the annual capacity of 2.6 Mil. TDW should be increased.

The permanent staff is held as low as possible (balancing the production variations). To meet these imbalances several thousand of temporary workers are hired who can be dismissed if needed at any time. A temporary worker earns (in 2004) 70 RMB (approximately 7 euros) per day, so that his monthly income can amount to from 1,200 to 1,500 RMB (120 to 150 euros).

As a state showcase the shipyard worries about social interests and the continuous education/qualification of its employees: It offers cheap flats for renting, free lunch as well as sports possibilities. A training centre with connected libraries is available.

- Hudong-Zhonghua Shipbuilding
Likewise member of the group CSSC, this shipyard originated in 2001 from the merger of the in 70 years old shipyards Hudong Shipbuilding Group and Zhonghua Shipyard which are located opposite to each other on the river banks of the Huanpu river in Pudong near Shanghai. This new shipyard disposes of an area of 1.35 Mil. square metres in 2,000 long bank lines and can produce 1.2 Mil. TDW annually.
It builds merchant and naval ships, big steel constructions (e.g., for bridges) and is number one in China for heavy diesel engines. Hudong-Zhonghua Shipbuilding is specified on the construction of big container ships (up to 8,100 TEU).
To the Hudong-Zhonghua group also belong Hudong Heavy Machinery (licences from MAN B&W as well as Sulzer), Edwards Shipbuilding (German Chinese joint-venture), Dong Ding Steel Structure as well as more than 100 producers of ships´ chandlers, shipbuilding suppliers as well as sub contractors. All together the group employs 14,000 people, including 2,000 technical employees/engineers for R&D as well as for design.
In addition to that it must be noted that the 11,000 of the Hudong-Zhonghua Shipbuilding direct employees cannot be dismissed. The real work is done by the
6,000 by sub-contracted workers who are to be distinguished from the rest by their blue overalls.

Subsidized lodgings are made available to the employees of the Hudong-Zhonghua group for 40 RMB per month (approximately 4 euros) in which several persons divide a room. With a five-day week the shipyard is paying monthly between 2,000 and 3,000 RMB (200 – 300 euros).

- **Jingling Shipyard**

Jingling Shipyard belongs to the CCNSG group, the third-biggest shipbuilding group in China after CSSC and CSIC. It is located in Nanjing (inland China) on the shore of the Yangtze river on a 300,000 square metre area – but only on 26,000 square metres ships are built. Founded in 1952 as a repair shipyard, the Jingling yard later shifted its main focus later to the construction of inland navigation vessels which were produced shortly after beginning of the Deng Xiaoping economic reforms in the late 1970s (the vessels are exported). Since 1995 the shipyard is also present on the international market for sea going ships (oil tanker, chemical tanker, RoRo ships). However, for the production process the conditions of the Yangtze river show special difficulties: The water level of the river allows only during a restricted period of the year the ships to be launched and to go to the coast.

The ship design is not part of the shipyard: Either it gets it from (also European) customers or it is buying the design from external design engineering companies. The shipyard has an annual capacity of 100,000 TDW and occupies approximately 2,800 people in the annual average.

The average monthly earning lies with 1,500 RMB (150 euros) with a 6-days week, 7h/day.

There is not a holiday entitlement after the legally guaranteed holiday days for the shipyard employees.

The company trade union to which all employees belong organises competitions and training courses on the subject Industrial Safety.

6. Some common problems, drafted from the case studies

- **Wages**
Compared to other manufacturing sectors, the wages in the Chinese shipbuilding industry are relatively low. This surprises as shipyards are located in the coastal provinces of China in which comparatively the highest wages are paid – the average annual pro-head income in 2004 in Shanghai is 2,800 USD, while in the province of Hebei (inland China) only 1,100 USD were earned (German Bank Research 2005, 18). But on account of the millions of migrant workers (respected number 150 millions, see below) there are no problems to recruit enough manpower for this industry.

Also the minimum wages in China – which are fixed by the national government and define really only least terms – vary from province to province (from 250 to 400 RMB per month = 25 – 40 euros).

Fact is, that according to the World Bank China’s poor grew poorer in the last years at a time when the country was growing wealthier: The real income of the poorest 10 per cent of China’s 1.3bn people fell by 2.4 per cent in the two years to 2003, the analysis showed, a period when the economy was growing by almost 10 per cent a year (Financial Times, 22 November 2006, 3).

West-European enterprises in China mostly pay a little higher wages and offer better social achievements than in the regional average. Also the terms of employment are better here. They try to limit the high operational fluctuation (see below). Compared with the West Europeans the US-American and Far Eastern investors (from Japan, Korea, Singapore and Taiwan) have the reputation of “bad exploiters” who do not follow regulations.

- **Labour Relations/Collective Bargaining/Unions**

The All-Chinese Confederation of Trade Unions(ACTU) founded in 1925 is the transmission strap between party and the working class according to Lenin’s doctrine. On the other hand, it should represent not only the rights of the employees in state-owned enterprises (SOE) and (since 2001) in private companies and joint ventures, but the interests of migrant workers too – a balancing act which cannot not succeed. Historically the members’ base of the ACTU lies in the (shrinking) state enterprises. According to information given by the ACTU itself (which must be doubted) the number of members is 134 million people. According to the industrial trade union responsible for the shipbuilding industry, out of a total labour force of
260,000 people working in the 2 major Chinese shipbuilding groups (CSSC and CSIC), 255,000 employees are trade union members (nearly 100 per cent). From 2004 onwards the financial support of the trade unions was limited by party and state. A process of the limited “cord cramping” of the trade unions from the party and the de-ideologisation of the mass organisations started. Although strikes are not unlawful, Chinese workers have no strike right – neither this right is regulated in the wage agreement, nor it is fixed by law. On the contrary, wildcat strikes are strictly punished by the state authorities – in comparison for example with Vietnam where these forms of industrial dispute are also indeed forbidden, but not pursued.

In China the enterprise-related wage agreements dominate: They are regulated “consensually”; that is the party does the default, and after that the company management and the company trade unions in state owned enterprises (SOE) sign it. In this area the operational chair of the trade union is the works director or at least the Humane Resource manager as well (all in one person). In the operational practice the wage agreements reflect only the law position and signify no higher wages/ improvements of working conditions. Juridically however, since 2004 there is also the opportunity to conclude single employment contracts beyond collective employment contracts.

• Labour Law

Before 2004 (labour) laws were passed simply by the government or even by the party by decree. Today there exists a proper legislation procedure. Within this legal process, the trade unions have an important voice. Still in 2006 there should be a new law for employment contract according to which those enterprises, making three years continuously profits, have to pay higher wages.

According to the Chinese labour law from 2004 the permanent employment contract has been removed by time-limited contracts with only restricted protection against unlawful dismissals. As a countermove the observance of the practiced legal regulations by the companies should be better controlled. For example, the working hours and the vacation are regulated by law:

• Maximum amount of working hours is 40 hours per week; 2 rest days per week are intended, one of the two is compulsory.
There is vacation in the legal holidays (one week in the Chinese New Year, three days around 1st May and three days around the national holiday 1 October). In addition, from 6 to 10 days of vacation after one year of seniority is the rule in Shanghai and in Beijing. Indeed, these legal regulations are not often kept in the operational reality.

Labour force: Core staff versus migrant worker/Fluctuation of the labour force
In the Chinese shipbuilding industry there is – embedded in the processes of removal and concentration - the trend to reduce the permanent staff and to fill the gaps with migrant workers in the case of extra orders. These migrant workers are cheaper and if needed they can be fired quite easily. The approximately 150 Mil. migrant workers in China who are recruited, above all, from the rural areas always move on the edge of the illegality (stay permissions etc.). Thus only every fifth migrant worker owns an employment contract. Now, however, there are attempts to integrate these migrant workers into the social security system. Since beginning of 2004 they are encompassed, for example, with in the accident insurance. These migrant workers as a "supplement" of the permanent staff still aggravate the problem of the weak ties also of the permanent workers to “their” companies. If in a region another enterprise offers even slightly higher wages than in the own enterprise is paid, many employees change immediately to this new enterprise. In particular the quick move of the higher qualified employees (around whom also in China a fight has broken out) signified for many enterprises a strong restriction of their respective production process. Chinese enterprises, joint ventures and foreign enterprises try to meet these problems by defining in the employment contracts high barriers for moving. These clauses define compensation payments (which orientate themselves for their part by the educational expenditures of the enterprise for the change-willing employee) which must then be paid by the poaching enterprise. Here the question arises, to what extent within the processes removal and concentration of the Chinese shipbuilding industry the qualification of the employees can be developed to an extent which can meet the high technical and organizational challenges coming from the production of high tech ships. Nowadays the organizational problem and the additional costs linked with the permanent integration of new and unqualified employees (see the remarks about
migrant workers) are also caught in the production process still by the extremely low labour costs and the high "flexibility" of the employees.

- **Health and Safety at the workplace**
  Also in the Chinese shipyards there is a high number of working accidents (see the - in comparison with Europe - low standards of health and safety regulations) – even if not as high as in the mining or the chemical industry.  
  The new working Health and Safety Law came into force in November 2002, and guarantees the following rights for the employees:
  - Clarification about all dangers in the workplace
  - Equipment with high-quality health and safety equipment
  - Own suggestions to the industrial health and safety
  - Walking out in the case of life-menacing situations
  - Compensation payments in the case of a working accident.

But like so often in China, the legal reality is different than the law. The paradigm change in China (not any more the single enterprise, but the state does now supervise the working conditions and the industrial health and safety) (still) does not function in the reality: Indeed, the companies have already dissolved very quickly after 2002 their own departments for supervising the health and safety conditions; and the state authorities are not yet so far to take over these tasks.

- **Social Insurance**
  In the rural areas the responsibility for the social security still lies with the families. According to the communist ideology in the cities the social security should be provided by the state owned enterprises (SOE). But after the economic reforms and the increasing privatisation of the Chinese economy the Chinese Council of State decided in 1986 to form the social security system independently from the SOEs. But the new law exists only on paper. A enforceable right for social security does not yet exist. It will probably last another 30 to 40 years, until there is a functioning social security system in China.
II Impact on European shipbuilding industry

The European participation in the Chinese shipbuilding yards moves at a low level. In contrast to European shipyards Japanese and South Korean shipyards are presently the strongest at the Chinese market. The biggest joint-venture with a foreign partner in the area of the shipbuilding is the partnership between COSCO and Kawasaki Heavy Industries from Japan. The number of the European shipyards which are represented actively with partnerships in China can be counted in a hand. Among the rest, there are two shipyards belonging to the Dutch Damen Shipyards Group as well as Shanghai Edwards Shipyard (a joint-venture that belongs to the German shipbroker Treuhand Hansa and the Chinese shipyard Hudong-Zhonghua. The French shipyard Chantiers de l’Atlantique (in February 2006 bought by the Norwegian group Aker) is providing technical expertise for the building of 132,000 to 147,000 cubic metre LNG carriers by CSSC’s Hudong Xhongua shipyard. These LNG carriers are the first of this type to be built in China. According to information from the European Commission approximately 50 experts from the French company are continuously working at the Chinese yard.

Here the question arises, why the especially the West European shipyards (in this case only the merchant ship new building, not the naval shipyards and repair shipyards) do not cooperate with Chinese shipyards as they do, for example, with East European shipyards. One part of the answer lies in the geographical position – the distances between China and Europe are too big to transport ship segments by water or street or railway at a reasonable price to the European shipyards (ship segments are not in small pieces as for example cars). Another part of the answer refers to possible direct investments of European shipyards in China. Apart from a specific ownership structure of European shipyards (partly in the private property and small sizes of company etc. with only low company capital which, make bigger financial engagement almost impossible) direct investments signify always also the removal and construction of additional shipbuilding capacities and the run-off of Know How. In spite of in harmonization with WTO legislation, there are huge difficulties to enforce protection of intellectual property rights also in court. The Chinese judicial system is dominated by many lay justices and few professional judges, who are badly paid. All this leads to a considerable magnitude of corruption. In comparison to Singapore, Thailand,
Vietnam and India, China takes a short-cut by the protection of the intellectual property rights (Asian Intelligence Survey, July 2004), while with regard to the corruption China takes "only" the third place – but still with dramatically bad values behind India and Vietnam. Also in the area of bureaucracy, transparency of the government and the company sector as well as the Standard Corporate Governance, China ranks low together with India and Vietnam (ibid.).

Whether the strategy to stop of the transfer of Know How by the European shipbuilding industry is the right way or not, can be discussed. The transfer of the knowledge from Europe to China happens anyhow – by European ship owners, who order their ships also in China, by the internationally classification societies and by the European marine supply/equipment industry (including the independent design offices), which is strongly export-oriented and allows to produce also in China. European and primarily German ship owners pass their orders to Chinese shipyards, which are then financed by European banks and classified by European classification societies.

**Home country of orders with the Chinese shipbuilding in 2002 in per cent**

<table>
<thead>
<tr>
<th>Countries</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>32</td>
</tr>
<tr>
<td>Germany</td>
<td>16</td>
</tr>
<tr>
<td>Iran</td>
<td>10</td>
</tr>
<tr>
<td>Norway</td>
<td>7</td>
</tr>
<tr>
<td>Greece</td>
<td>7</td>
</tr>
<tr>
<td>Denmark</td>
<td>6</td>
</tr>
<tr>
<td>Italy</td>
<td>6</td>
</tr>
<tr>
<td>Belgium</td>
<td>3</td>
</tr>
<tr>
<td>Singapore</td>
<td>3</td>
</tr>
<tr>
<td>Sweden</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: Craig Hughes/DNV

In 2002 roughly half (47 per cent) of all shipbuilding orders came from European.
In view of menacing overcapacities in the world shipbuilding in certain segments from 2010 onwards, most European shipyards rather concentrate upon a special shipbuilding: RoRo ferries, cruise ships, smaller double hull tankers, but also high tech smaller (TEU 4,000-5,000) container ships which are not built thus by Chinese (and nowadays neither by Japanese nor South Korean) shipyards. The Chinese shipbuilding industry with its immense building capacity concentrates not upon the special shipbuilding dominated by European shipyards, but upon Bulkcarrier, bigger container ships and tankers. By implementing this strategy the Chinese will hit the Japanese and South Korean shipbuilding industry hard. Thus the South Korean shipbuilding industry has already reacted in June 2006 and has explained that it wants to enter into the market for cruise ships and compete with the Europeans (press release June 2006).

Nevertheless the strategy of the European shipyards – with its concentration on special ship types –, needs a constant advancement of the technology, improvement of the organisation and the rise of the qualification of the shipyards’ employees.

In parallel, China above all also concentrates upon the expansion of its own merchant fleet to transport the import and export goods by domestically-owned ships. This could absolutely lead to a misalignment of the competitive levels in the maritime area: Due to the strengthening of the Chinese merchant fleet in the future the global competition could shift more to the transport level – i.e. between the current dominating European and the Chinese shipping companies. That would mean that the logistic branch could be the battlefield of global competition in this respect.

Quite differently from the European shipbuilding industry, the strongly export-oriented European marine supply/equipment industry is growing. In 2005, for example, 65 per cent of the turnover of the German marine supply/equipment industry derived from export. 23.3 per cent of these export orders came from China, 29.7 per cent from the other EU countries and only 9.8 per cent from South Korea. The rest is divided between the remaining Asian countries, North America and others (see: VDMA shipbuilding and Offshore-supply/equipment industry in 2005). On the other hand this does mean, that 15 per cent of the total turnover of the German marine equipment industry has been exported to China.
In addition, several European maritime suppliers have their own production plants in China. Reasons for these FDI are:

- Low production costs;
- Closeness to the market: As a market for suppliers China plays a bigger and bigger role because China wants to be a world market leader in 2015 in shipbuilding;
- Local content regulations: A certain part of the ship (80 per cent until 2010) must come from the domestic (Chinese) production.

The question whether a European marine supply/equipment industry needs the European shipbuilding as a "national" reference industry for its global survival is judged by the experts very differently and controversially.

In the public discussion about the future of the European Shipbuilding industry the different labour costs in Europe and in China plays a big role

**Labour costs per month/worker in different shipbuilding nations, 2002, USD**

- Germany / Netherlands 2,400 USD
- Japan 1,800 USD
- South Korea 1,400 USD
- Poland 800 USD
- Croatia 750 USD
- Singapore 600 USD
- The Ukraine 400 USD
- Turkey 400 USD
- China (Shanghai) 375 USD
- Romania 300 USD
- China (interior) 200 USD
- India 150 USD

Source: Presentation of Damen Shipyards Group on the Dutch shipbuilding day in the Driebergen/Netherlands, Spring 2003

Of course using only the term "labour costs" is an unsufficient tool for comparisons. The real measurement could be done by “labour costs per unit”, which comprises
productivity etc. But these figures are not available. Despite of this, by using only the labour costs, it could still give an idea of the importance of the labour costs in the decision-making process of ship owners to order ships from yards in the different world regions/countries.

Two scenarios for the European shipbuilding/maritime industry:

There are two consequences of the increasing Chinese shipbuilding capacities on the European shipbuilding and maritime industry:

- Increase of the competition situation:
  Worldwide (in particular in China, but also in South Korea and in Vietnam) increasing production capacities in shipbuilding lead to a reinforced competition of the shipyards on orders. The competitive pressure is not only strengthened by the rapid expansion of the shipbuilding capacities in particular in Chinese shipyards, but in addition, by the extremely low labour costs in China and the unclear financing methods (state loans etc.). In expectation of a possible stagnation of the global shipbuilding market it may be supposed that the Chinese shipyards will compete more with Japanese, South Korean and also European shipyards in a special segment. This possible development is based on the acceptance that Chinese shipyards will enter especially the market for technologically simple ship types (like container ships) which are built at the moment especially by Japanese, South Korean and partly also by European yards. Japanese as well as South Korean shipyards could through this development becoming active in segments of technically more sophisticated ship types. This process would create a tougher competition with European shipyards. Thus the South Korean shipbuilding federation explained in June 2006 the entrance of the Korean shipbuilding in the cruise market for the future. But even if the South Korean and Japanese shipbuilding industry would enter the cruiser market, it would not compensate possible losses of market shares to the Chinese shipbuilding industry, as the global market for cruisers is very limited, compared with the global markets for container ships, bulkers, oil tankers etc.

- Defusing of the competition situation:
  China is in 2006 already the fifth largest commercial nation worldwide and will climb in 2020 to number 2 according to predictions of the World Bank. Besides, merchant vessels show the most important means of transportation to export the Chinese
goods, to import the raw materials and to organise Internal-Chinese trade (along the high industrialized coastal regions and the Jangtze river). To modernise the fleet, and to create at the same time new transport capacities, China will cover the rising needs for ships from domestic ship production. Therefore, during the next 10 years, highly complicated ships as for example cruise ships are of low interest for the Chinese shipbuilding industry.

Not the field of low tech ship production but the logistic branch could be in the future the “battlefield” of competition between Europe and China.

The Know How transfer as a key element to develop Chinese shipbuilding industry:

Inevitably for the further development of the Chinese shipbuilding is the Know How transfer from Europe to China, by the European shipbuilding industry, the ship owners and banks which build and finance ships in China, by the classification societies, but also by "blueprint trade" of the European shipyards and/or the design offices commissioned.

There are two contradictory trends:

- For the European shipbuilding industry the uncontrolled run-off of Know How is very dangerous,
- For the European marine supply/equipment industry in the medium term this transfer remains without big negative consequences, rather on the contrary: It strengthens at first their global competitive situation.
III Policy recommendations

What can be the strategy of the European shipbuilding industry facing the Chinese competition?

First to put the main points briefly:

1. Product mix: Intensifying the concentration on the high tech ship segment as well as on other ship types like container ships, double hull tankers etc.
2. Improvements of the vertical relations of the European shipbuilding industry (supply chain)
3. Improvements of the co-operations between shipyards comprising smaller yards as well (horizontal cooperation)
4. Reinforced cooperation in sensitive fields like R&D and qualification of the workforce
5. Development of Pre- and After-Sales Services
7. Consistent EU industrial policy for maritime industry.

In detail there are following recommendations:

- **Mix of production: Intensifying the concentration on the segment of high sophisticated ships (including container ships, double hull tanker etc.):**
  Cruise ships, RoRo vessels, special ships and naval ships are mainly for the export market. Parallel to this European shipbuilding industry has to keep on track to build (high tech) container ships, double hull tankers etc as well. That does mean that the European shipbuilding industry has continuously to improve its competitiveness: Investments in research and development, improvement of the working organization and product organization, constant increase of the qualification of the employees must move the European shipbuilding into the position to stay 2 to 3 years ahead of the Asian competitors.

- **The improvement of the vertical relations of the European shipbuilding industry with the marine supply/equipment industry:**
  On average 1/3 of the added value of a ship is produced by the shipyard itself, while 2/3 are produced by the suppliers. Formerly integrated shipyards, which
covered the whole production process of a ship, are no longer the standard model. Today shipyards are flexible enterprises which are tied together in value added chains with external suppliers. The focus is the creation of the interfaces between yards, their service partners and marine suppliers/equipment manufacturers. Nowadays many suppliers are not sufficiently recognized by the European shipyards as a partner, but as compliable contractors to whom the dependence on the shipyards is made clear again and again. This must change very quickly.

But an optimization of the Supply-Chain-Management is not sufficient to realise the requirements of the market on appointment (loyalty, quality and costs).

- **Horizontal cooperation between shipyards must be improved:**

Lacking cooperation between the shipyards (horizontal cooperation) generate structural deficits of European shipyards in the global competition, caused by the split and extremely different ownership structures within the European shipbuilding industry.

Shipbuilding is a high technology and a system industry, where the system ability and the interlinking of the industry must stand in the foreground. Between the enterprises of the maritime industry, different relations and dependencies exist. Networks, branches, enterprise groups are an important basis of its dynamic. Efficient supplier's-buyer's connections are a determining location factor. Strategic alliances with universities, research institutions, developing institutions and consultation institutions also contribute to the competitiveness. Those shipyards in Europe (and this is the majority) which do not co-operate with each other, will get into considerable difficulties after the prospected lack of the new building boom especially concerning container ships (headwords: global over-capacities, global predatory competitions).

However, there are also shipyards which co-operate with each other (mostly with yards which belong to the same group/owner) and are very successful in the global competition (e.g., Aker, Damen, TKMS). The European-wide cooperation which is not organized within a group has mostly the character of the relocation of labour-intensive production into low wage countries especially
in Eastern Europe. This deals less with cooperation as a win-win situation rather with an outsourcing of work into cheap labour cost countries and expresses a split within the European shipbuilding industry between West and East.

- **A reinforced cooperation also in "sensitive" areas (R&D, qualification etc.) is necessary:**
  There are already examples for cooperation in these fields like the "Euroyards"-platform\(^2\). Cooperation functions in these areas, above all, on the basis of trust cultures, which have their roots in personal contacts. These trust cultures across the borders of the single shipyard should be developed in the future increasingly by the shipyards themselves. Industry federations and also trade unions can play here an accompanying role, allow contacts and create rooms in which mutual trust can originate.

- **Development of a Pre-and-after-Sales service by the European shipbuilding:**
  Not only the purchase of (technologically sophisticated) ships should stand alone on agenda of the yards, but financing, harbour infrastructure and worldwide repair services should be integrated into a complete package and be offered to the customers. On this basis the customer can value the whole logistics service.

- **A promising start is the initiative “LeaderShip 2015” of the European shipbuilding industry**
  The initiative from 2003 defined in a booklet\(^3\) 30 concrete recommendations in areas ranging from trade policies to industrial consolidation are made. Translating these recommendations into action is helping to ensure a prosperous future for European shipyards and marine equipment manufacturers. The work undertaken represents one of the first applications

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\(^2\) The aim of EUROYARDS is to foster the interests of its partners, both by adopting common positions before international bodies promulgate the policies of the sector, and by implementing through working teams created ad hoc, projects in the field of Research &Development and purchasing policy, in order to cut costs. EUROYARDS represents the following major shipbuilding companies in five European countries: Aker Yards Oy (Finland), Aker Yards S.A. (France), Fincantieri S.p.A. (Italy), HDW AG (Germany), Navantia S.L. (Spain) and Meyer Werft GmbH (Germany).

\(^3\) LeaderSHIP 2015 – Defining The Future of the European Shipbuilding and Ship Repair Industry
of the Commission´s renewed approach to industrial policy in a specific manufacturing sector. Leadership 2015 has been adopted by the EU Commission.

But Leadership 2015 should be reversed in a way, that practical solutions, especially on the national and regional levels, should be implemented.

However the EU as such has no consistent industrial policy for the shipbuilding industry. Each member state is organizing the policy on its own. That is why the creation of a “European Maritime Coordinator” is necessary.

The coordinator’s tasks could be coordinating all the EU financed programmes related to maritime industry, partly individualized in the various DGs.

- **Another promising approach is the EU Social Dialogue Shipbuilding:**
  Both employers and trade unions in the member states as well as on European level, share a common view on the perspectives and challenges that the European shipyards are facing. In order to strengthen the dialogue and implementation Leadership 2015 recommendations, the European Social Dialogue Committee was formed in September 2003 in which CESR represents the employers’ side and the EMF the employees’/trade unions. Supported by the European Commission DG Employment and Social Affairs, the Committee concentrated its work in the expiring year on different topics from scientific surveys and high-profile conferences at EU level to widespread events at national level sparking the interest young graduates and highly skilled workers in working for the shipbuilding and ship repair industry. There are four working groups performed the following activities:

  a) Shipbuilding Survey: In 2004-2005 the University of Bremen/Institute Labour and Economy-IAW carried out a survey of the European shipyards. The document is available in seven European languages and a database for further policies. A panel study is planned in 2008.

  b) Training und Qualification forum: In October 2005 a seminar took place in Trieste/Italy to get information about the different schemes of qualification and training in European shipbuilding countries/industry. Qualification is one of the key tools to meet the global competition successfully.
c) Shipyard Week: The Committee initiated the first European Shipyard Week from 27 to 31 March 2006 featuring numerous events to promote the sector all over Europe. The week started with a well-attended Social Partner Conference at the European Parliament on 22 March in which distinguished persons from the European Parliament as well as from the European Commission, from the employers’ and from trade unions’ side as well as well-known academics participated.

d) “Tool Box” Project: The idea was to work on an inventory of tools on how to cope with the ups and downs of industry demand cycles while maintaining skills and employment. This project was carried out by the European Monitoring Centre for Change (EMCC) at the Dublin based Foundation for the Improvement of Working and Living Conditions.
Abbreviations:

CESA        Community of European Shipyard's Associations
CGT         Compensated Gross Tonnage
            The compensated tonnage of a ship, i.e. the ship's volume adjusted
            (compensated) by a factor to render the amount of work at the yard equivalent
            for different types and sizes of ship.
DWT         Dead Weight Tonnage
GRT         Gross Register Tonnage
            Gross Register Tonnage represents the total internal volume of
            a vessel, with some exemptions for non-productive spaces such
            as crew quarters; 1 gross register ton is equal to a volume of
            100 cubic feet (2.83 m³). Gross register tonnage was replaced
            by gross tonnage in 1994, under the Tonnage Measurement
            convention of 1969.
GT          Gross Tonnage
            Since 1994 internationally valid information for the whole measurement of a
            ship. Gross Tonnage refers to the volume of all ship's enclosed spaces (from
            keel to funnel) measured to the outside of the hull framing. It is always larger
            than gross register tonnage (GRT), though by how much depends on the
            vessel design.
LNG carrier Liquefied Natural Gas carrier
            Liquid gas tankers must be distinguished between LNG-and LPG-carriers,
            transporting Liquefield Natural Gas (LNG) or Liquefield Petroleum Gas (LPG).
            To call LNG, also natural gas, is extracted from pure gas fields. Deep-frozen
            with possibly – 161 degree centigrade it can be liquefied and shipped in this
            state.
R&D         Research & Development
RoPax       Combined Roll-On/Roll-off and passenger ship with
            large
            RoRo decks and limited passenger facilities.
RoRo        Roll-On/Roll-Off ship designed for carrying vehicles
            and
            wheelbased cargo, which are driven onboard and ashore.
SOE         State Owned Enterprises
The VLCC (Very Large Crude Carrier) belongs to the biggest ship types and has a load-carrying capacity of more than 200,000 metric tons. 25 per cent of the fleet are more than 25 years old and have no double hull. 83 per cent of the oil exports from the Persian Gulf are transported with VLCC’s. A frequent standard size carries approximately 300,000 metric tons. These ships are approximately 335 metres long and 58 metres wide.
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