WTO and China's Defense Industry (Parts III and IV)

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This translation contains two parts of a four-part detailed study on the opportunities provided to China's defense industry by China's entry to WTO. The study first appeared as a longer article in the March 2000 issue of the PLA-backed journal, Strategy and Management.

In this study, the author argues that although under the current WTO terms, China's five major defense industries are not open to the outside world, those terms do not prevent the defense industries from "going out" to engage in arms trade with other nations and taking advantage of China's domestic market. The article is divided into several parts. A history of U.S.-led crusade against China's defense industry is chronicled first. Then the author predicts golden opportunities within WTO for the PLA to obtain advanced military technologies under various trade regimes regulated by WTO. Furthermore, the author analyzes the domestic market for China's defense industry to penetrate.

Part III

Hypothetically, after China's entry into the WTO, the five major defense industries in China should be safe from any threat because this sector of Chinese industry is not to be opened to market forces. As a matter of fact, that is a false assumption. The defense industries can be formed into a solid economic foundation because by nature they are high tech and high VAT industries. Under the restraints of limited domestic demand, military products have to be sold on the international market on a large enough scale for them to be cost-effective. The Swedish SAAB fighter jet with its "duck-like" structure is believed to be too advanced for the international market and therefore has been limited to internal needs only. As a result, the SAAB series is in serious financial trouble. Although the manufacturers of the "Euro-fighter" jointly developed by Britain, Germany, Italy and Spain, have received orders for 620 jets, that profit is far from enough to cover the $69 billion spent on research and development and production of the planes. They too are in a deep financial predicament. To spend more on research and less on production might help avoid overspending but it will set back the level of development and improvement of the defense products, especially military equipment, because naturally many technical problems can only be discovered and overcome after the products have been manufactured. Therefore, the United States, the former Soviet Union and Russia today have all adopted an approach to developing one generation of weapons at a time, selling them on the international market in huge numbers, making profits and then starting working on the next generation of weapons. If China's defense industries are not prepared to grasp the opportunity offered through China's entry into the WTO to export massive quantities of new military products to the world market, it will be difficult to sustain any further research and development. Otherwise, ultimately they will have to continue

turning to civil-use goods.

After the Gulf War and the NATO bombing campaign in Yugoslavia, major arms exporters such as the United States have trumpeted the irreplaceable significance of high tech weaponry, making it even more difficult for developing countries to sell any goods with lower-technology content. China is restricted even more by various multilateral and bilateral treaties to export high tech weapons. The United States, in its position as the world's hegemonic power, has also resorted to political and diplomatic maneuvers to help its own manufacturers compete with China for arms sales. One of the missions of the United States Defense Secretary on his visits to foreign countries is always to promote arms sales for the U.S. manufacturers. In 1998, to help Lockheed Martin defeat the French aircraft manufacturer Dassault in an arms deal, the then President Clinton made a personal phone call to the President of the United Arab Emirates, asking him to purchase F-16 fighter jets, instead of Mirage 2000 bombers.

After China's entry into the WTO, the Western countries, especially the United States, will use various gray-area measures, such as self-imposed export restrictions reached through bilateral agreements, to limit export of China's defense products and civilian products produced by the defense industries. At present there are up to a thousand various agreements among the WTO member countries and there is little the WTO can do to stop them. In 1989, China was made to sign the first satellite launching agreement with the United States, which stipulated the number of flights and the allowed charges. Because the number of launches China made fell below the stipulated quota during the agreement period from 1989 to 1994, the U.S. trade representative office found the excuse not to increase the number of flights in accordance with China's increased launching capabilities. In 1995, the United States affirmed that China's Long March Rocket launching system would be allowed only 11 flights before the end of 2001, and the charges had to be 15% lower than charged by the Western countries. After China enters the WTO, for its own trade protection the United States will continue to resort to similar bilateral agreements to prevent China's defense products from coming on to the international market.

In addition, China's defense enterprises will come face to face with the Western multinational corporations in a race for the international market. And at the present time, China's companies have little competitive edge over the Western counterparts. In terms of the degree of concentration of China's industries, apart from oil and natural gas exploitation industries, tobacco processing, oil refinery and coking industry, the degree of industrial concentration in most other industries in China is lower than 30% or 40%. In terms of the industrial structure, in 1998, there were only 21 industries that had more than 100 large enterprise consortiums: mainly in textile, chemical materials, chemical products, transportation equipment manufacturing, general machinery manufacturing, non-metal mineral manufacturing, electric power generating and supplying, steam power and hot water generating and supplying. In view of the average sizes and scales, China's large industrial enterprises are simply not in the same league with the Western multinational corporations.

With the deepening of the innate conflicts and surplus crisis in a modern capitalist system, the Western multinational companies have grown immensely in size since 1990s after rapid waves of mergers and buyouts. For instance, on July 25th 1997, the Boeing Company, in which 80% of its sales were in passenger planes, and McDonald Douglas, in which 85% of its sales were in military aircraft, announced a merger to form a new Boeing Company. 30% of the United States defense budget used to be devoted to developing the United States air force and every year the Pentagon and NASA used to allocate several hundred million dollars to McDonald Douglas to fund its new military aircraft projects. With the merger, the Boeing Company will be able to use the federal funding and new technology developed for military aircraft to further research on passenger aircraft. In this way, the new company can maintain a superior monopoly over the technology and productivity of both military and passenger aircraft. The shares of the new Boeing Company are worth $13.3 billion; its sales totaled $40 billion, of which the former Boeing Company had $28 billion, and McDonald Douglas had $20 billion. After the merger, the Boeing Company's sales went up to $50 billion, with an employment of 200,000 and orders worth $100 billion. Now 84% of the business in the large and medium-sized international civilian aircraft belongs to the Boeing Company. To increase their cutting edge, EU aerospace manufacturers have also been pushing for mergers and alliances. Germany has asked France to speed up the privatization process of its Aerospace Industrial Development Corporation saying that if this company stays state-owned, then the future European Aeronautic, Defense & Space Company (EADS) will collapse. The French Aerospace Industrial Development Corporation was established in 1979 with an employment of 37,000, and an annual sales revenue of 51 billion francs. Its products include aircraft, missiles, satellites, defense products, systems and industrial products. The Exocet missile is its most known product, while the Airbus, Eurocopter and Ariane Rocket are jointly produced with German Aerospace Company and British Aerospace Company. Although a major aerospace manufacturer, it offers no competition against the Boeing, so could very well be swallowed up after privatization. So, on July 22nd 1998, when the French Government announced the privatization plan for the French Aerospace Industrial Development Corp., it also announced its merger with Aerospatiale Matra SA, a subsidiary of the Lagardere Group. The French government cut its own stake of the company from 100% to 48%, while letting Matra own 33% and the rest, the 19% would be sold on the stock market. As a result, its assets are worth 80 billion French francs, employing 56,000 people, ranking only behind Boeing, Lockheed-Martin and Raytheon-Hughes. The French government has also pushed for the merger of French Aerospace Industrial Development Corp. with the private aircraft manufacturer Dassault by transferring the 46% state shares in Dassault to French Aerospace Industrial Development Corp.

On the satellite launching market, there have also emerged cross-national alliances by multinational companies. In 1995, Lockheed Martin Company urged NASA and Russian Aerospace Bureau to commission the Russian Krunichev State Research Institute to work on the "FGB tether" and "ANGARA high-thrust propulsion system." The former is an important component of the international space station, and the latter is a propulsion system larger than a Proton rocket, which will be used by Preshedzik Rocket Launching Center by the beginning of the next century. The Boeing Company, together with the

Russian RSC Energy Company, the Ukraine Southern Company and the Norwegian Kvaerner Shipping Company, launched a four-partner joint venture with a total investment of $100 to 150 million. Under this joint effort, the Ukraine partner will produce component parts of the “Skytop” Rocket, which will be assembled and marketed by a Californian company. This joint venture will also include a maritime commercial satellite-launching complex. In an effort to compete against the Ariane-5 Rocket, the United States’ partner has also helped the Russians lease an island in the South Pacific to build a $1 billion super satellite launcher. The European Ariane Aerospace Company has reached an agreement with Alliant Techsystems, which is one of the world's three biggest satellite equipment manufacturers next to Lockheed Martin and McDonald Douglas, to bid for the United States federal launching contracts together with the other two rivals. The United States Air Force in August 1995 agreed to let the above three bidders take on the initial research project and a few years later decided on a final winner. Without strong financial backing, it would be difficult to participate in a bidding marathon such as this. The General Manager of Alliant Techsystems, Mr. Schwartz said, once winning the deal, the European Ariane Aerospace Company would be providing the low-temperature liquid-fuel main booster called Vulcain for the Ariane Rocket. The European Ariane Company has also joined Alliant Techsystems in bidding for the United States Air Force’s Hercules Rocket upgrading project, to improve on a solid-fuel booster so that the Hercules Rocket could launch heavy surveillance satellites and other heavily loaded equipment into orbit. In exchange, the European Ariane Company will sell their Rocket engine technology to Alliant Techsystems for it to manufacture it in the United States.

The profit margin that large consortiums have over smaller industrial enterprises comes from the low cost and high efficiency through their massive scales. The fact that the majority of China’s enterprises are of modest sizes has so far meant China’s large enterprise complexes enjoy efficiency advantages. On July 1st 1999, "the Big Ten" defense industry group companies were established. They are: China Nuclear Energy Industrial Group Company, China Nuclear Industrial Construction Group Company, China Aerospace Science and Technology Group Company, China Aerospace Mechanic Electronic Group Company, The First China Aerospace Industrial Group Company, The Second China Aerospace Industrial Group Company, China Shipping Industrial Group Company, China Heavy Industrial Shipping Group Company, China Weaponry Industrial Group Company, China Weaponry & Equipment Group Company. But compared with the huge mergers of Western multinational corporations, these group companies no longer have any size advantages. As the production cost comes down in the American and European multinational defense companies, their competitiveness shoots up. While in China, in 1998, apart from the growing productivity rate, all of China's large industrial enterprises suffered financial loss. For instance, although the total capital ratio climbed up from 51.3% in 1994 to 54.6% in 1998, and sales income ratio went up from 41.7% to 43.9%, the profit ratio actually plunged from 65% to 59%. On the one hand, the problem is caused by the way the enterprises are being developed; on the other hand, it has much to do with the over-speeding of China's market economy. And right now, the market liberalization is still largely confined to the domestic market. Once China's economy is brought in line with the international market, the profit ratio of China's large enterprises will drop even faster.

With China's entry into the WTO, it seems that its defense enterprises should be able to gain easier access to more advanced technology through more available international trade, but it won't be an entirely smooth process. As the main target for the United States trade restrictions, China will find it hard to take full advantage of all the trade privileges offered by the WTO membership. Soon after the Sino-U.S. agreement was reached on China's entry into the WTO, Wen-ho Lee was arrested. It served as a warning signal to China that the United States would never give up their efforts at technology restrictions on China, regardless of China's entry into WTO. In 1996, the United States asked Israel not to sell the early warning system on aircraft to China, or it would withdraw the $250 million aid promise to Israel. On April 11th 2000, at a meeting with the Israeli Prime Minister Barak, Clinton again reinstated this warning against the Israeli deal with China. In the same month, while Clinton asked the United States Congress to grant China the Most Favored Nation (MFN) status, he also had the State Department issue a speech criticizing China for obtaining Lockheed Martin's technology when China did testing on the satellite's near-earth solid motor in 1994. The United States was well aware of China's nearly forty-years' successful track record in rockets. That was exactly why the Asian Satellite Company signed an agreement, on March 2nd 1993, with China's Great Wall Industrial Corporation on launching Lockheed Martin's Asia II satellite into low-to-earth orbit using the Great Wall II harnessed Rocket, and on purchasing China's near-earth solid motors. As part of the contract, China's Great Wall Industrial Corp. agreed to go with satellite experts from the Asian Satellite Company to visit the motor factory site accompanied by the United States government officials. What the United States government was doing was to remind the United States defense companies that even if China were accepted into the WTO, it would not allow China to enjoy the same trade privileges the United States had.

At the same time, other developed countries have also been very caution when doing business with China. For instance, in December 1975 when Britain agreed to sell MK 202 military turbine engines to Xi'an Airplane Manufacturer, it was not because of the high profit from the sales, but because these 202 turbine engines would only fit China's F-6 fighter jets, and the higher speed, higher altitude F-7 and F-8 series would need much greater thrust than could be provided by the 202 turbine engines. As a result, although China learned some technical know-how from the turbine engines, it was of no benefit for improving the technology on China's fighter jets, and the turbine-6 engines produced by Xi'an were out of date as soon as they rolled off the assembly line. Japan's approach has been to sell China hardware, not software, in order to keep China's companies technically dependent. Therefore, although more technology could come this way with the WTO entry, if China's defense enterprises relax their sense of self-reliance, self-dependency, self-initiated creativity and responsibility, then the opportunities that could come with the WTO entry would turn into severe challenges.

Part IV

Although the five major defense industries prohibit foreign capital entry, large parts of the products have long been turned to civilian use. In 1999, products for civilian use took up 65% of the total products by the China Aerospace Mechanic Electronic Group Company and sales from civilian products stood at 70% of total sales. The China Weaponry Group Company has been divided into three major civilian product offshoots: mechanic, chemicals and optic-electronic products, with automobile manufacturing as the main line. The civilian product sections of the defense enterprises will be open to outside competition after the WTO entry. The capital-intensive and technology-intensive products will be among the first to take on the shock. Because of the limited state funding, the main pattern in China's defense industries has been to develop military and civilian products at the same time and rely on the civilian product sales to support the defense product development. Once the civilian product market shrinks, the "Big Ten" defense industrial groups will experience serious negative impact.

There are two main series of products for civilian use produced by China's defense industrial enterprises. One series include products related to the main line or could be used both by the civilians and the military. The other series bear no relations with the main line of industry, e.g. automobiles, motorcycles and electrical household appliances produced by aerospace and weaponry enterprises.

China's automobile industry is known to have "a good middle and two bad ends". The "good middle" represents medium-sized trucks. China is a major medium-sized truck manufacturer in the world. Trucks such as Liberation and East Wind are purely domestic both in terms of brand name and intellectual property right. They make sure that most of their component parts are domestically produced and have established large enough production scales. However, China's defense industries did not start entering the automobile market until 1980s, which means there is little room for them on the well-established medium truck market. And with the WTO entry, they are not the ones who will benefit from new opportunities in this area.

The "two bad ends" indicate pick-up trucks and tractor-trailer trucks, and these are the areas where China's defense enterprises have sunk their concentrated investment. Automobile manufacturing relies on scales, and breaking into this field is no less difficult than breaking into high tech defense industries. Although the defense enterprises have injected more investment into automobile production than sometimes their main line of products, they are dwarfed by domestic automobile enterprises in terms of sizes, not to mention multinational Western automobile manufacturers. The defense enterprises' pick-up truck lines, because of their modest sizes, can not withstand strong market ups and downs. For instance, during the 1994 macro-economic readjustment process, the once prosperous truck production line on Base 061 of the aerospace industry slowed down so much that the employees only received a little more than 200 *yuan* a month by 1996. Also because of the limited sizes, those enterprise tend to concentrate on smaller cars, e.g. Changan Machinery Factory's Changan Auto, Guizhou Aerospace Industrial Corporation's Skylark and the Weaponry Corporation's Little Northern Lucky Star.

However, efficiency can only be achieved through scale in the production of small cars.

Most big cities believe that small cars have poor driving performance and more small cars will put more pressure on the already crowded roads. Various cities have issued regulations at various times that small cars are only allowed on the roads on alternate days - half of the number on one day and the other half on the next. Some cities have even banned taxis from using small cars such as Skylark. The more and more strict exhaust emission restrictions have also impaired the future of small cars. In October 1998, the Chinese authorities decided to raise China's automobile exhaust emission standard to the 1992 European level. From January 1st 1999, China's automobile market prohibited sales of small mini-vans, mini buses and mini-sized cars such as Auto, which have low-level carburetor engines, as well as Fukang 1.36 and standard VW Jetta that have medium-level carburetor engines. At the same time, China enforced installation of purifying devices on several hundred thousand vehicles already in service.

Although China's defense enterprise have considered the possibility of making bigger-sized cars, China's medium-sized and luxury cars will have no competitive edge anyway after China's entry into the WTO, because of their high cost, and lack of intellectual property right, industrial patents and brand name effect. For instance, the luxury Buick model produced by a joint venture between Shanghai Automobile Manufacturer and General Motors costs 380,000 yuan [about $46,350] to buy in China, while the U.S.-manufactured Buick only costs $18,000. By the year 2006, when the automobile import tariff comes down to 25%, it will cost only 186,000 yuan [about $22,680] to buy an U.S.-produced Buick Regal in China. The low homemade percentage of cars assembled with foreign parts underlines the sustained high production cost. The number of domestically produced parts on Guizhou Aviation Corp's Skylark and Chongqing Changan Machine Tool Corp's Auto, the two small cars manufactured by defense enterprises, is even smaller than on VW Jetta, Fukang and Suntana.

At the present time, under the protection of tariff and non-tariff measures, the United States is only allowed to import 600 cars a year to China. By 2006, when the import duty on automobiles is down from 80% - 100% to 25% and non-tariff protection measures are abolished, especially when foreign automobile manufacturers are granted trade and retail rights and car loans, foreign multinational auto makers will be selling finished automobiles in China on a massive scale. This will make it difficult for China's automobile assembling enterprises and their JV partners to upgrade their products and technology. That will trap those enterprises in their position as mere assemblers of foreign auto parts and forcing them to become low-VAT product assemblers for the foreign manufacturers. As for the automobile subsidiaries of defense industry's enterprises, plagued by their smaller sizes, lower-grade product lines and shortage of capital, they might not have a chance to exist even as assembling plants.

Because of the labor-intensive nature of the automobile part factories in the defense industry, they ought to stand a better chance at meeting the ensuing challenges and therefore have more business opportunities after China's WTO entry. But a combination of severe capital shortages and poor management, which is inherited from equally poor management in the whole-car makers, leaves them little room for survival in the face of powerful competitions from multinational auto giants such as Derf.

When the WTO entry transitional period is over, import tariff on auto parts will have been reduced from the present 45% to 10%, and China's protective measures on domestic cars and differentiating tariff policy will have been eliminated. China's No. 495 official policy on custom duty outlined a set of differentiating tariff regulations. According to this policy, when the percentage of homemade parts in assembled cars reaches 40%, the import duty on loose auto parts will be 50%. When it goes to 60%, the import duty on parts will be down to 40%. And by the time the homemade percentage climbs to 80%, the auto parts import duty will not only be down to 32%, the import quota will be eliminated altogether. This policy has spurred rapid and widespread growth of auto part enterprises and turned many defense industry's subsidiaries into auto parts makers. Once this policy no longer exists and foreign multinational auto giants such as Derf are granted trade and retail rights, the domestic whole-car makers will quickly turn to foreign companies for their better products. The result will be enormous numbers of bankruptcies among domestic auto parts makers that have been in existence for the past dozen years. The survivors will be left to produce auto parts that are low tech, low-VAT and low profit generators.

The motorcycle industry is in a similar situation. The few largest motorcycle makers that are offshoots of the defense enterprises all use technology from foreign multinational companies such as Japanese companies to produce or assemble motorcycles. They do not have much independent intellectual property right. After China's WTO entrance, boosted by low tariff, disappearing protective non-tariff regulations and the granting of auto trade and retail rights, China's foreign technological partners will start importing cars directly to the Chinese market. The technological cooperation that the multinational manufacturers once offered to China will probably be out of the window, and those companies will not only stop providing newer technology to the Chinese partners, they will use the same products to compete on China's market. The multinational companies might be prepared to sign new cooperation agreements forcing the subsidiary companies of China's defense industry to accept harsh labor division conditions. By that time, China's defense enterprises' motorcycles in the range of 50 - 100 mil might stand a better chance at survival because of their low-tech content and low price. But the 125-mil motorcycles, especially the 250-mil motorcycles will have to confront heavy invasions of similar products from foreign importers.

Hypothetically, as labor-intensive assembly line industries, the electric household appliance offshoots of defense enterprises should have little problem holding on to their existing market after China's WTO entrance. However those enterprises have been ailed by the following troubles: their products are primarily copies of Western originals, they suffer from perpetual shortages of cash flow, there is too much overlapping investment, introduction and construction of the same lines of products and too much overstock. In a sense, these electric household appliance companies have stepped into the micro-profit phase prematurely. Their average profit rate was below 5% in 1999 and many such enterprises have already declared bankruptcy or on the brink of bankruptcy. The New China Refrigerator Factory, an offshoot of the aerospace industry, used to enjoy such popularity that people would have to use the backdoor approach in order to buy one of

their refrigerators. From 1996, though, this factory started accumulating overstock and 900 out of its 1,200 employees were laid off.

At present, as the non-tariff protective measures for the Chinese electric household appliance makers are still in place and before the Western multinational companies have been granted trade or retail permits, such enterprises have not yet been impacted by import. For instance, the annual quota for imported color television sets is only 5 million. With China's WTO entry though, digital household appliances will start pouring onto the Chinese market from Western countries. The ironic thing is that China's household appliance companies use mainly copied technology, which is already obsolete in Western countries, and their production pattern is mainly assembly lines, which creates higher labor cost than Western countries could afford. So in theory, after China's WTO entry, such enterprises could continue paying technology royalties, continue their assembly lines and even gradually achieve a higher percentage of homemade components. However, as the Chinese consumers' taste becomes more selective, they will probably want to go for digital household appliances to be imported by Western multinational companies in the near future and turn away from the Chinese copies of such products. And as the defense-enterprise-turned-household appliance producers have little independent intellectual property right and technological control, they will not be able to break away from the labor division forced upon them through the technological monopolies of Western manufacturers. Therefore, apart from an elite few that have already built up their own research and development facilities and obtained independent intellectual property right and technological upgrading abilities, most other enterprises in this field will be squeezed out of business by the upcoming digital products.

After China's WTO entrance, the civilian product lines directly related to the main products of the defense enterprises are not going to be untouched by challenges and opportunities either. China's aerospace industry has had an early start and accomplished sizable scales. Before the China Aerospace Industrial Corporation was subdivided in 1999, it had assets worth more than 60 billion *yuan* and employed 2.65 million people, ranking the third largest in the world. But the strength of China's aerospace industry lies mainly in the production of military aircraft rather than passenger jets. In the field of passenger jumbo jets and medium sized passenger aircraft, it is predominantly assembling and packaging lines without intellectual property right. Starting from 1980s, China more or less gave up the 10-year-old research projects on producing its own jumbo jets and medium sized passenger planes, and began to seek technological cooperation with Western airplane manufacturers. The plan had been to start from producing component parts to assembling passenger planes, and eventually, through joint designs and technology, to building China's own passenger planes by 2010. But that plan fell through after the new Boeing Company decided to drop its MD90 passenger plane production to concentrate on a new Boeing 717 plane and the European Airbus Company backed out of an agreement with China on jointly designing and building the AE100 passenger plane. Now China has become the largest export market for American passenger aircraft manufacturers. Out of ten American-made passenger planes, one is sold to China. Airbuses are also coming to China in increasing numbers. After China's WTO entry, China's two major aerospace industrial groups will have to make enormous

efforts to restart on a self-reliant, self-equipping and self-developing track, to ensure that this strategic industry, so crucial to China's national security, will not fall into the control of others.

The large commercial-vessel shipping industry, which has so far drawn little attention, will however meet with more opportunities than challenges after China's WTO entrance. China used to be a country with no technology to build ten-thousand-ton vessels or the money to purchase large numbers of them. It was not until 1960s and 1970s that China built two ten-thousand-ton shipyards, one in Shanghai and one in Dalian. In April 1969, China launched the 15,000-ton Daqing Oil Tanker, and a few years after that, China was capable of building 50,000-ton oil tankers and 25,000-ton cargo ships. China's endeavors at ship building development in 1970s were well timed because it later benefited greatly from the Western shipping industry's re-grouping and readjustment in 1980s. China's shipyards managed to obtain more than 50 licensed technologies on marine equipment production from other countries as a result, which put China's marine equipment industry in close league as other Western countries. From early 1980s to 1995, the homemade ratio of China's marine equipment production went from 20% to above 80%. China's marine architectural technology progressed from first contracting out, then joint venture efforts, eventually to purely Chinese home made, making great improvement in each step. In 1981, the total tonnage of China's ship production was 418,000 tons, with 66,000 tons for export. In 1991, the production went up to 818,000 tons, and 36,500 tons went to export. In 1993 the figure went to 1.337 million tons, with 585,000 tons for export. In 1994, the production jumped further to 16.44 million tons, with 825,000 tons for export. In 1982, China's commercial vessel manufacturing was 0.89% of the world's total, which went up to 2.39% in 1990, 4.09% in 1993 and around 5% in 1994, becoming the fifth largest ship manufacturing country in the world after Japan, Korea, Germany and Denmark. In 1995 China overtook Denmark to rank the fourth largest before passing by Germany in 1996 to be the third largest player on the world's ship building market. In terms of tonnage, China's vessels have gone from 20,000 tons to 300,000 tons. In terms of the types of ships, China's shipping industry has gone from exporting bulk freighters and oil tankers to exporting world class chemical product carriers, roll-on-roll-off ships for automobiles, all-purpose vessels, large cool-ventilation container vessels, refrigeration ships and liquid gas cargo ships. The Jiangnan-Model 65,000-ton bulk freighters and Dalian-Model 980,000-ton oil tankers, both designed by Chinese shipyards are widely acclaimed for their design and performance by the world's ship building and marine authorities and have been popular exporters. The Jiangnan-Model bulk freighter is designed exclusively for operating along the Panama Canal and known for its sound technology, solid performance and low operational cost. This freighter has entered the United States and German markets. Categorized as the "China South Jiangnan Model", this bulk freighter has become the only Chinese-made vessel to be listed on the London ship leasing market. The number of China's ship export partners has grown immensely to cover more than forty countries including Hong Kong, the United States and Canada. In the first part of 1997, China exported 8,500 vessels, earning $694 million in foreign currency, which represented a 102.4% increase over 1996, making this industry the fastest growing exporter among China's mechanic electronic product makers. In 1999, the China Shipping Industrial Group Company and the China Heavy Industrial Shipping

Group Company received bookings totaling 4.88 million tons, worth 24.6 billion *yuan*, or 60% of the total tonnage of export contracts of the year in China, setting a historic record. The output value, foreign currency income and sales of the China Shipping Industrial Group Company all went up, while the China Shipping Heavy Industrial Group Company yielded an output value of 10.8 billion *yuan* and received 9.8 billion *yuan* in sales.

Because of the low capital percentage in shipping industry where labor takes up 40% of the production cost, the United States shipping industry is mainly devoted to military vessels. Of the 17 large American shipyards, 7 specialize in building battleships, 3 in building naval auxiliary boats and the other 7 have their specialty in repairs and maintenance of battleships. There are also more than 200 medium to small-sized shipyards - among which only 43 have the capacity to build ships longer than 112 meters. Every year American shipyards receive orders for several dozen military vessels and only a dozen or so commercial ships. Although U.S. firms own 21% of the over 1,000-ton commercial vessels in the world, most of them are imported. According to the Japanese shipping industry's statistics, of all the large oil tankers over 200,000 tons in service today, 2 would have reached the 25-service-year retiring threshold in 1997, 12 in 1998, 42 in 1999 and 60 such oil tankers will need to retire in 2000. Most of other large ships built in 1970s will also enter the retiring age by that time. Needless to say, China's shipping industry will have much work to do in order to make the best of the opportunities China's WTO entry will bring. For instance, although the total output volume of China's shipping industry ranks third in the world, it is only 1/7 that of Japan and 1/6 that of Korea. In addition, China's shipping industry is divided into two patterns. On the one hand, there are the "Big Two" shipping complexes, while on the other hand, there are several hundred small shipyards and ship repair yards under the loose control of 13 central government departments and 22 provincial, municipal and autonomous regional authorities. Therefore on average each enterprise's output volume is below 10,000 tons, or only 25% of the Japanese and 50% of the Korean average. So while China is capable of building high performance 300,000-ton oil tankers for export, the lower end of the industry is tied down by a huge surplus of inefficient small shipyards. Therefore, on the eve of China's WTO entry, the important task for the shipping industry is to quickly break down regional and departmental protective barriers and speed up the regrouping and merger process.