**China air separation equipment market status and recent developments**

1 Overview of domestic and international air separation market

As China's economy continues to grow steadily， China's air separation equipment manufacturing industry is gradually developing， especially in large air separation projects， the market share of domestic equipment is increasing year by year， and the situation that foreign companies dominate the world in large air separation projects is gradually changing. However， we should be fully aware that in large air separation equipment projects， our comprehensive capabilities and levels compared to major foreign companies， there is still a gap. In the world air separation equipment market， most of the annual share is divided by foreign companies. 1999 to 2002， the world air separation market sales performance of major companies are shown in the table below.

Note: 1， the figures of 2001 and 2002 are taken from the annual report published on the website of each company.

2. The unit is billion dollars， \* is billion euros.

3. The total sales listed in the table are not only for industrial gases and air separation equipment， but also for many other combined businesses， and the "share" is the share of industrial gases and air separation equipment. Therefore， this comparative analysis can only be used as a rough reference.

Most of these eight companies have supplied medium and large-sized air separation equipment to China， only Linde of Germany has supplied more than 50 sets of air separation equipment to China， while Air Liquide， BOC， Praxair and Messer have invested in several gas companies in China， only Messer has invested in 15 joint ventures in China by the end of 1999， with a total investment of 170 million USD. In addition， Air Liquide and Hangxiang established Air Liquide (Hangzhou) Co.， Ltd. and Linde and Jin Chong established Linde Process Equipment Co.， Ltd. which are mainly engaged in the manufacturing of air separation equipment.

Of course， China's air separation market is also a part of the world air separation market. Due to the original backward foundation， there is a big gap with foreign countries. After the reform and opening up， many large complete sets of equipment were introduced， especially the sustained economic growth after the 1990s， which promoted the increase of investment in large steel and chemical enterprises and further accelerated the introduction of large air separation equipment， thus promoting the further improvement of the overall level of domestic enterprises from supporting capacity to design， manufacturing， installation and operation management， and gradually forming a three-legged tripod with Hangxiao， Kai Air and Chuan Air as the core enterprises The situation of the core enterprises Among them， Hangxiang accounted for about 68% of the domestic share in 2002， while the large equipment accounted for more than 70% of the domestic share， the total industrial output value in 2002 reached 106.87 million yuan， and the sales revenue reached 105.61 million yuan; in the first half of 2003， there were more than ten sets of new orders for air separation above "20，000" grade， and the professional equipment set a domestic record - "50，000". In the first half of 2003， there were more than ten sets of new orders of "20，000" grade air separation， and the professional equipment set a domestic record - "50，000" air separation; Chuan Air is a latecomer， jumping to the second place in 2002， with total industrial output value of 403.19 million yuan and sales revenue of 363.78 million yuan. In the first half of 2003， there were 3 sets of air separation equipment of "20，000" or above， and the professional equipment reached "28，000". In 2002， the total industrial output value reached 256.48 million yuan， the sales revenue reached 257.77 million yuan， and the professional air separation equipment reached "40，000". In addition， there are also small and medium-sized enterprises such as Ha oxygen， Su oxygen， Hand oxygen， Jiang oxygen， etc. occupy a small part of the air separation market share. Foreign enterprises Air Liquide (Hangzhou) and Linde Process Equipment Co.， Ltd. have shown a gradual growth trend in recent years in the performance of large air separation equipment.

2 China Air Separation Market

At present， China's air separation market is: large total volume， small average volume， individual volume (single indicator) is not enough， and there is still some room for growth for sustained growth. Take Asia and Australia， the sum of oxygen production capacity in 2000 is about 200000t/d， of which China accounts for 35%， Japan accounts for 30%， South Korea accounts for 12.5%， China Taiwan accounts for 5%， Australia accounts for 4%， Malaysia accounts for 3%， Indonesia accounts for 3%， Thailand accounts for 2%， Singapore accounts for 1.5%， the other 4%. In terms of average volume， Japan is 4.5 times more than China. China's steel production is about 1.5 times of Japan's， but the oxygen production capacity is only 1.17 times of Japan's; from the individual volume， China's air separation is basically the production of oxygen， nitrogen and argon， while the production of high-purity nitrogen， helium and other rare gases is still insufficient. Therefore， the development of China's air separation equipment still has a certain amount of space. Therefore， domestic enterprises should seize the opportunity and make efforts to explore the market and seek further development.

From the perspective of historical development， before the reform and opening up， the gap between China's air separation industry and foreign countries was quite large. After the reform and opening up， with the introduction of foreign large air separation， prompted the rapid development of China's air separation industry. And this period of the world's air separation industry has also seen several large technical improvements， for example， plate fin heat exchanger， molecular sieve adsorber， gauge packing tower， etc.， China's air separation industry also quickly followed， making China's air separation industry and the gap between the international in gradually narrowed. From the current situation， the gap caused by both technical reasons， but also economic reasons.

From the technical point of view， the domestic large backbone enterprises led by Hangxiang have "60000" level air separation equipment design， manufacturing， installation capabilities， but there is no mature experience and independent contracting performance. Without the successful transformation of Zhenhai Chemical's "28000" air separation and the experience of Baosteel's series of large air separation supporting supplies， if Baosteel does not transform the "30000" air separation to Hangxiao， China's air separation industry would not be able to step out of the "30000" class. "30，000"， to "40，000"， "50，000"， "60，000" level equipment. If there is no large complete project， it is impossible to have large unit equipment to go with it. Without mature large unit equipment， it is also impossible to have stable and reliable operation of the complete set of equipment. Even foreign companies are the same， like Baosteel 5 # "72000" and 6 # "60000" air separation equipment， foreign parties have encountered many problems in the installation and commissioning process， each time the process of solving problems is the process of accumulating experience.

The successful operation of large air separation equipment reflects the improvement of the overall level of development of the industry， from unit equipment， control components to the overall compatibility， stability and reliability of the control system， all require a very high level. This high level requires not only long-term theoretical research as a guide， but also long-term practical experience to verify. What our company needs more is this opportunity. On the contrary， if Baosteel does not give "30，000" air separation to the domestic industry， and who will give "30，000" air separation to the domestic industry? Because of the large air separation equipment is to invest in people， run a certain risk of the project， the general air separation users will not be easy to "30000" level air separation equipment to suppliers who do not yet have such a track record. From this point of view， the state should give support to enterprises， enterprises should support each other and cooperation， in order to promote the breakthrough development of large-scale air separation equipment in China. Therefore， strictly speaking， this is not only a technical bottleneck， but to a greater extent， an economic bottleneck. Likewise， the gap is not only a technical gap， but to a greater extent is still an economic gap.

From the current state of affairs， compared with foreign-funded enterprises， domestic enterprises have a greater advantage in the "30，000" level of the following projects; in the 30，000-50，000 level of the project， domestic enterprises are disadvantaged; in the "60，000" level above domestic enterprises are basically not competitive in projects above "60000" level.

3 Analysis of the advantages of domestic enterprises

After the reform and opening up， the situation that the market of Chinese air separation equipment was dominated by large foreign companies in large equipment has gradually changed. In 2001， Hangxiang contracted for the 30000m3/h(02) of Baosteel， in 2002， Hangxiang opened the air of Texas "40000 "In 2001， Hangxiang contracted to supply 30，000m3/h(02) for Baosteel， in 2002， and in 2003， Hangxiang signed a contract to supply "40，000" air separation equipment for Beitai， which set up a milestone in the history of air separation in China. Therefore， after the breakthrough of 30，000m3/h(02) air separation equipment， it is a step closer to the development of ultra-large scale air separation equipment for China's air separation manufacturing industry. Although most of the domestic large air separation share was still taken by foreign companies (such as Linde Masteel "43000" in 2002， Nanjing Yangzi "43000"， BOC "38500 " and Wuhan Iron and Steel "60000" and recently Linde Benxi two sets of "35000")， but in just a few years the domestic air separation manufacturing enterprises to achieve such performance is still encouraging. At the same time， in the process of supporting large foreign air separation equipment， but also to promote the ability of domestic air separation manufacturing enterprises and the level of improvement， the introduction of Baosteel 6 # air separation equipment and supporting is a good example.