ASU Conference Promotes China's Technological Transformation

The first modern ASU technology conference ever held in China is being hailed as a huge success and a stepping stone to future development of the Chinese ASU market. Cryogas International is pleased to present two perspectives on the event — one American, one Chinese. We also offer a quick look at a new ASU built by Linde AG with much of the equipment and internal components of the plant having been manufactured in China by Chinese companies.

4200 tpd oxygen plant No. 6 at Baoshan Iron & Steel (Group) Corp. of Shanghai was built with mostly Chinese manufactured parts and equipment.

by Joseph T. Bernstein

I recently attended the Modern Air Separation Plant Technology Conference in Chengdu, the capital of Sichuan province in Southwest China. The conference, the first of its kind to be held in China, was sponsored jointly by the Sichuan Air Separation Plant Group (SASPG) of Jianyan (60 kilometers southeast of Chengdu) and Allied (International) Process Engineering Ltd. of Hong Kong.

SASPG, the second-largest air separation plant manufacturer in China, is a State-owned company, but seems to be earnestly trying to become a competitive free market company. The group's capability includes not only large oxygen plant coldboxes and component design and manufacturing, but also valves, compressors, cryogenic machinery and cryogenic vessel and tank design and manufacturing.

Allied (International) Process Engineering Ltd. is involved in construction and process plant building. Its capabilities include civil, structural, architectural and process design and engineering. The company made a substantial contribution to the success of the conference by organizing the general scope, speakers, program, translation and other services.

The two sponsoring companies plan to work together in marketing oxygen plants outside China. SASPG will be

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By Stephen Lee

July 26th and 27th were special days in the history of Chengdu, China, especially for the participants in the 1999 Modern Air Separation Plant Technological Conference.

Chengdu, a city of 9.8 million people, is located at the heart of Sichuan Province of China and played host to the conference, the first-of-its kind ever conducted in China.

Because of its spectrum of invited speakers and participants, the conference attracted some important potential ASU customers (steel mill managers, petrochemical plant managers, chief engineers from design institutes and professors from universities) and government officials, for a total of about 150 participants. Global gas companies such as Praxair, Messer Group, BOC and Air Liquide, also sent representatives. In addition to presentations by technologists from the sponsoring companies and others, both Praxair and MG made speeches.

The conference was jointly sponsored by the Sichuan Air Separation Plant Company of Jianyan (60 kilometres Southwest of Chengdu) and Allied (International) Process Engineering Ltd. of Hong Kong. It was organized with objectives to promote technology integration between the Chinese and the West, and to better understand the concerns of both suppliers and operators of air separation facilities.

Allied Process is convinced that merging Chinese and western air separation technologies and fabrication capabilities is in the best interest of China and surrounding Asian nations. Allied has forged several technology alliances with U.S. companies — Cryogenic Consultant Services of Weston, Conn. and AMCS Corp. — which the company feels uniquely qualifies it for fulfilling its mission of bringing state-of-arts technology

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supplying the actual hardware and Allied will contribute the technical input, project management and marketing capabilities.

The conference offered technical presentations on state-of-the-art reviews of Western air separation practices and an attractive sight-seeing package tour, as well as the usual networking opportunities present at a technical conference. It attracted some of Sichuan's important potential customers (steel mill managers, petrochemical plant managers, etc.), government officials and a total of about 150 participants.

Early in the week, the attendees were invited to tour the Sichuan Air Separation facility. This was the highlight of the conference for me. The company appeared to be well in touch with "state-of-the-art" technology in many basic areas. During the tour, we saw components of a 17,000 NM^3/hr oxygen plant which SASPC was building for a Chinese steel company. Other basic components the Chinese were manufacturing included brazed aluminum heat exchangers, distillation columns and expander/booster compressor units.

To help launch the manufacturing efforts for these products, SASPG, or the Central Chinese Design Institute, had purchased Western design technology, including brazed aluminum heat exchanger technology from Altec, expander technology from Rotoflow and cryogenic sieve tray technology from Linde.

The components of the 17,000 NM^3/hr oxygen plant which we saw (brazed aluminum heat exchangers, distillation tower with Sulzer packing and expander/booster compressor units) appeared to be of good-quality and, at least in appearance, indistinguishable from what we would have seen in a similar U.S. or European facility.

Sichuan has a vacuum brazing unit for brazed aluminum heat exchangers capable of producing cores up to 6.1 x 1.2 x 1.2 meters in size. We also saw, in the separate vessel shop, a huge Boldrini head-forming machine capable of producing 5.2 meter diameter heads. A cryogenic tank, tank truck and vaporizer department was fabricating stationery and transport liquid oxygen and nitrogen tanks and tankers.

The plant, located in its own compound within the city of Jinyang, includes a huge complex with living quarters, shopping and recreation facilities for the workers and their families. It appears to function as a separate village of about 10,000 inhabitants within the city of Jinyang.

Although the head and vessel and brazed aluminum exchanger shops are outside the main compound, most of the other shop facilities were inside the compound walls. In addition to the above mentioned facilities, the compound also houses ferrous and non-ferrous casting facilities, a valve factory, a vessel fabricating company, the cryogenic machinery group (expanders, compressors, pumps, etc.) the cold box fabrication group, a foundry and forging factory and a cryogenic liquid truck and tank fabrication shop.

The total building area is 222,386 m^2 and includes about 3000 workers, 1300 of whom are engaged in fabrication. There are about 400 technicians and 80 senior engineers on the staff.

Having started under the socialist perspective of doing whatever was necessary to manufacture oxygen plants, SASPG is engaged in making all necessary subcomponents such as valves, safety valves, vessel heads, pumps, etc., much as U.S. and European companies did in the 1950 — 1960 era, when cryogenic specialty equipment was not readily available.

Whether the company will continue to find it economically attractive to continue producing all subcomponents in-house under the free market era remains to be seen. My impression is that the company, like many state-owned industries, will face decreasing government support and increasing pressure to be a viable free market company.

So far, the largest oxygen plants built by Chinese companies are in the range 15,000 to 17,000 NM^3/hr capacity. In the past, larger plants typically been built by Western companies.

Based on China's commitment to acquire and utilize the latest Western technology, either through outright purchase or joint venture operations, I believe it's only a matter of time before Chinese companies will be competing for the very large scale oxygen plants in China and other areas throughout Asia, as well.

A big question remains about the ability of SASPG and other Chinese companies to sell their large air separation plants in the international market. Despite the apparent good quality of basic coldbox components, Chinese valves or instruments or some machinery may not be attractive in international markets.

This is one major area where Allied Process plans to work with SASPG to provide additional technology transfer, project management and marketing skills.

It will certainly be interesting to watch the future of the industrial gas business in China. About the only thing that does seem predictable is continued substantial growth.

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and project execution practices from the West to Sichuan.

Mr. Shan Jin-ming, managing director of the Sichuan Air Separation Plant Group, is particularly excited about the strategic alliance established with Allied Process. In delivering the conference's keynote address, Mr. Shan referred to Allied Process as "our new working partner."

"They have an extensive international network, not only in areas of operation technology and support, but also more importantly in the area of capital commitment, all of which would make them the ideal window for us to reach our foreign customers, both here and overseas. We will explore the market and enjoy the rewards together," he told the conferees.

Dr. Brent Lok, president of Praxair China, also delivered a keynote address in which he predicted China's air separation business would grow at a rate of two times the local GNP, doubling itself in the next five years.

As China's economy booms, he said, the demand for

Conference Progam

TOPIC	SPEAKERS
Cryogenic Argon	Joseph Bernstein, President Cryogenic Consulting Svs. Weston, Conn. USA
Advanced Process Cycle Development	Dr. Robert A. Mostello Associate, AMCS., Inc. / USA
Process Control and Operational Technology	Mr. Ishmael Chalabi President, AMCS., Inc. / USA
Tangshan Steel 17,000 NM^3/hr ASU project status	Mr Peng Zheng Chun Deputy General Manager SASPG
Operational Experience in Design Institutes	Xiao Jiali, Professor Engineer Beijing Central Engineering and Research
Operational Experience in Petrochemical Industry	Ji Haitao, Utility Director Tianjin United Chemical Corp.
SASPG's Products and Services Launching	Xie Lemin Deputy General Manager SASPG
Allied Process's Products	Stephen Lee, Managing Director Allied Process
Operational Experience in Iron and Steel Industry	Mr. Zhaoqin Oxygen Installation of Panzhihua Steel & Vanadium Ltd.
Advanced Gas Application Technology in Iron and Steel Industry	Peter Wrampe Technology Director Praxair Greater China
Advanced Gas Application Technology in Petrochemical Industry	Catherine Burgess Product Manager Messer Group
Latest Air Compressor Technology	Simon Yang, Manager Ingersoll-Rand
Latest Oxygen Compressor Technology	Guo Yukun, General Manager Shenyang Blowers
Structured Packing Development & Application	Guo Yuzhen, Manager Sulzer Shanghai
Process Control Hardware Application	Mou Shanhong, Manager Honeywell China
Adsorbent Technology	Edmond Zhang, Manager Shanghai UOP LTD.
Future Air Separation Plant Development Direction and Technology Roadmap	Dr. Brent Lok, President Praxair Greater China

industrial gases will follow. As an example to illustrate his point, Dr. Lok predicted there would be more and more working wives in China who will not be able to go to the fresh market everyday like they do now.

What does this imply? More demand for frozen meat, more fast foods and more soft drinks! The future for industrial gases is rosy if the economy continue to grow. Dr. Lok spoke with authority.

It would be fair to say we did not achieve the whole mission in two days, which is impossible. But everybody was so excited that we managed to "kick off" the long journey of cooperation in a very open and trusting manner. As the Chinese government focuses more and more on economic growth, opportunities for cooperation will no doubt increase.

The conference ended with a panel discussion that featured a heated debate on the development and retention of technical professionals within state enterprises. China is a rich seedbed for specialists and Hong Kong, with its wide experience and international connections, can be a strong alliance, which we hope is a blessing for all the parties involved, and, of course, to our end-users.

(Stephen Lee is the Managing Director of Allied [International] Process Engineering Ltd. Any reader interested in securing a copy of the conference proceedings may contact him via fax 852-2805-2902; E-mail: stephen.lee@allied process.com; or write to Allied [International] Process Engineering Ltd, Room 507-515, Trade Square, No. 681 Cheung Sha Wan Road, Kowloon, Hong Kong.) ❑

4200 tpd ASU built in "record time" with mostly Chinese equipment

by Li Junkai

In early 1997, the Baoshan Iron & Steel (Group) Corp. of Shanghai in The People's Republic of China contracted with Linde AG of Germany to build a new 4200 tpd oxygen plant. In slightly more than two years — 27 months to be exact — oxygen was being produced from the new No. 6 plant. The acceptance certificate for contractual performance was granted in July.

Most of the facility was built with locally supplied equipment as Linde AG's Process Engineering and Contracting Division joined with a number of Chinese partners, including the Baosteel Engineering and Equipment Co. Ltd. (BSEE) for the supply of what became known as "products of cooperation."

BSEE was responsible for the detail engineering, the drawing conversion and the local procurement on the basis of the technical information supplied by Linde. The "products of cooperation" included pressure vessels, structural steel, heat exchangers and silencers provided by:

- Hangzhou Oxygen Plant Group Co. Ltd.
- Hangzhou Tong Da Heat Exchanger Factory

- Jinzhou Heavy Machinery Works
- Zhangjiagang No. 2 Chemical Machinery Works

Linde and BSEE were jointly conducting quality inspection during the manufacturing of the equipment.

ASU features advanced technology

The new air separation plant is Baoshan's sixth oxygen facility and incorporates all state-of-the-art technologies, such as high efficiency vacuum brazed aluminum plate fin heat exchangers, structured packings, internal compression of oxygen, nitrogen and argon, as well as the cryogenic generation of pure argon (99.999%) — patented and commercialized by Linde in the beginning of the '90s. A highest degree of automation and load change capability allows the steel workers to operate the plant according to their fluctuating demand and in the most economical manner. Very low operating cost has been achieved.

The size of the plant, combining all these new technologies, also is a milestone for the Chinese air separation industry. In total, an amount of 4200 tonnes per day of products are generated in a single unit.

Utmost care has been taken during the design of the plant to meet environmental preconditions and also newest safety aspects have been considered.

Linde Business Relations in P. R. C.

The history of Linde air separation technology in China goes back to the first oxygen plants supplied to Shanghai in 1911. Since then the company has installed more than 55 ASUs in China. Beside the ASUs, more than 60 other process plants, such as ammonia plants, gas processing plants, petrochemical plants, plants for waste water treatment and plants for sulfur recovery have been supplied by Linde AG.

The establishment of Dalian Linde Process Plant Company Ltd. in Dalian 1995, a joint venture between Linde AG and the Bing Shan Group for the fabrication of process plant equipment, and the foundation of Linde Gas Xiamen Ltd. in 1996 are further milestones for Linde's activities and business relations in the People's Republic of China. ■