

With the rapid development of science and technology, end users and contractors are tending to focus on product quality. Meanwhile global competition is becoming increasingly fierce, resulting in price pressure. To keep ahead of these developments, companies such as Chase Valve have embraced smart manufacturing.

By Yoyo He



Chase Valve is a force to be reckoned with in its domestic market. The company is a leading supplier to three major oil power companies (Huaneng, Datang, Huadian, Guodian and China Power). Chase Valve is planning to increase its turn

Chase Valve and the power of smart manufacturing

Cai Tianzhi, the chairman of Chase Valve, has worked in the valve industry for more than thirty years. Having witnessed the establishment of and evolution in the Chinese valve industry first-hand, he is convinced that the sector - or at least selected companies - have the potential to compete with the industry's top global performers.

As for Chase Valve, also known as Datong Reciprocity Group, he intends to forge a "Made in China 2025" smart factory that integrates products/production, big data, the Internet of Things and artificial intelligence. And he is already well underway in this endeavour. In just four short years, the company has successfully introduced intelligent manufacturing equipment and has taken the lead in the development of the first real-time simulation equipment for low temperature/cryogenic valves in China. In addition, Chase Valve is equipped with

professional valve production bases, foundries, forges and the self-control equipment factory which, Mr. Tianzhi states, has set a benchmark for high-end valves in China.

Chase Valve is a high-tech enterprise integrating the whole industry chain of the valve market with a business scope that covers science and research, engineering and trade service. As a new professional valve manufacturer in China, established in 2011, Chase Valve is the first low temperature cryogenic valve manufacturer with independent intellectual property rights. Its products are widely used in oil/gas, petrochemicals, fine chemicals, (electric) power, urban construction and water treatment. Internationally, Chase Valve is represented in more than 30 countries. With the strong support of the local government, the company signed a contract to build a new factory in January 2014. Construction was started



companies (PetroChina, Sinopec, CNOOC) and five over by 1 billion yuan (EUR 131 million) in 2020.

in March and by September of the same year the new factory was already producing valves. Currently, Chase Valve has an annual production capacity of 100,000 units and has obtained more than 20 international and domestic standard certifications. It is able to independently develop and manufacture valves of various performance levels and materials, including globe valves, ball valves, gate valves, butterfly valves, check valves, semi-ball valves, Y-type slurry valves, discharge valves, pressure reducing valves, regulating valves, special valves, special valves, etc., in more than 10 categories and 10,000 specifications, indicates Mr. Tianzhi.

Innovate for success

Mr. Tianzhi believes that innovation is key in the evolutionary process of any industry, giving companies the competitive edge they need. "If they don't innovate, the threat of commoditisation is lurking around the corner," he says. Therefore, Chase Valve - under the leadership of Mr. Tianzhi - is constantly making



"Chase Valve Academic Workstation" launch ceremony

bold explorations and innovations on the path of smart manufacturing. In conjunction with Italy's top casting equipment supplier IMF (Emford) Group Co., Ltd., Chase Valve has become the first company in China to establish a so-called green intelligent high-end valve production line. This unit integrates environmental protection and intelligent production technology. As a result, the production line is highly efficient and keeps pollution (emissions) to an absolute minimum.

"This is unprecedented in the world. No one has ever done it before. Even for our Italian partners, it is a bold attempt to design and build such a highly automated valve production line", Mr. Tianzhi proudly says.

High production efficiency

He explains that the green casting production line is based upon various technologies and processes, namely a pure inorganic binder, a powder accelerator and gas hardening. No volatile organic compounds (VOCs) will be released, Mr. Tianzhi says. This accounts for the entire process, therefore eliminating harmful pollution from the source. What is more, it adopts an intermediate frequency induction furnace, mechanized fixed-point casting, an enclosed cooling system, mechanical unpacking, a mechanized regeneration system for used sand, inside grinding room cleaning and ventilation. Dust removal is also addressed to ensure the dust concentration

Facts & figures green production line

Project Name: Green Intelligent High-end Valve Production Line

Year: 2018

End User: Chase Valve

EPC: Emford (Wuxi) Technology Co., Ltd.

Project

description: The project is planned for the Chase Valve owned factory, covering a construction area of 18,000 square metres and a total investment of 232.90 million yuan (approximately EUR 30.5 million). Two green intelligent high-end valve production lines will be built. After the project is completed, the lines will be able to produce 50,000 tons of high-end valve castings. The project is contracted by Emford (Wuxi) Technology Co., Ltd., a subsidiary of Wuxi Xinan Foundry Machinery Co., Ltd. The project adopts pure inorganic binder technology to build a fully automated moulding and casting production line. The line involves various stages: starting from the automatic addition of metal to the intermediate frequency induction furnace, sand mulling by double-arm continuous sand mixer, vibrating compaction, automatic turning of the stripping machine, mechanized two-flow coating, the surface dry baking, mechanized core making, automatic closer closing, fixed-point casting of the pouring machine, robotic arm unpacking and used sand recycling to the final dust-free casting polishing. In short, this green casting line is said to be the most complete and advanced production line in China.

in every working area meets all applicable standards. Finally, the entire workshop will be equipped with an air exchange system that will continuously feed fresh air into the workshop. This has greatly improved the factory environment, enabling employees to work in a comfortable setting, which in turn provides a strong guarantee for the production of high quality products. In addition, the green production line can be connected with the MES system of the factory. By embracing automation in this way Chase Valve has attained high production efficiency. Giving an example, Mr. Tianzhi indicates that 1,500 units could be processed by just 10 employees within an eight hour shift with an almost 100% product yield rate.

Talent

With the technical strength and the courage to take the lead, Chase Valve has made great strides towards smart factories and “Made in China 2025”, Mr. Tianzhi states. “Via the integration of IoT (Internet of Things) automation, intelligent monitoring, touch notice-board, virtual reality, processing automation and cloud databases, Chase Valve has promoted the combination of information technology and traditional production processes.”

This progress has also been recognized by others. The company has been honoured as the “National High-tech Enterprise,” “Fujian Intelligent Manufacturing Model Enterprise” and the first “Smart Manufacturing Technology Centre of High-end Valve Production” in China. Smart production is important but still one side of the coin. Research and development is equally important, Mr. Tianzhi says. “Weak independent research and development



Chase Valve's headquarters

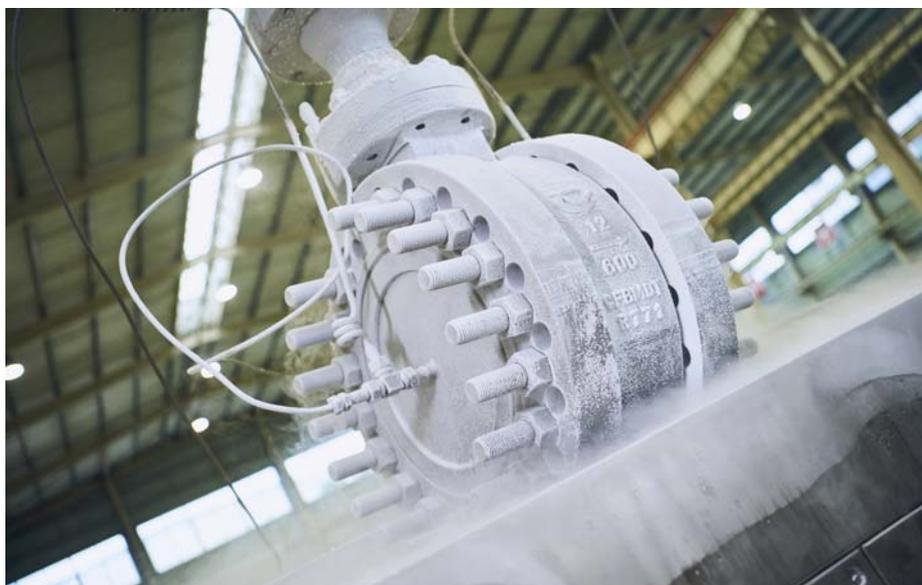
capability has always been an obstacle for high-end valves' localization in China.” In order to solve technology bottlenecks and break up foreign monopolies he personally visited many valve factories around the world and in doing so attracted the attention of world-class technical talents. For example, he successfully invited Massimo Zappettini, a mechanical engineer of Milan Polytechnic University, and the senior valve materials research team represented by Zeng Ruihong from Taiwan to join Chase Valve. Hence, Chase Valve has built a R&D- team consisting of top-notch experts from home and abroad to focus on high-end valve manufacturing and R&D in materials science. “Talent is the most valuable resource of Chase Valve, and it should be cherished and developed as the first priority!” Mr. Tianzhi insists.

Intellectual property

With a strong R&D team in place, Chase Valve has successfully developed the first 4,000-metre deep-sea valve and an ultra-low/cryogenic temperature valve for LNG applications that is able to operate at minus 196°C. Such valves are very ‘high-end’ products, with a single ultra-low temperature valve understood to be worth more than 2.8 million yuan (EUR 365,000). According to Mr. Tianzhi, this technology is unprecedented in China and is an example of world-class level technology that is founded on independent intellectual property rights. Based on its own patent technology of “a low-temperature austenitic stainless steel and its casting manufacturing method” (patent No.201710068442.3), “valves with preloaded disc spring in the packing seal” and “valve seat with preload design”, Chase Valve has further developed a series of new ultra-low temperature valve technologies including special austenitic stainless steel materials, a finite element analysis (FEA) calculation system under low temperature/cryogenic conditions, valve body gasket structure optimization, long neck bonnet valve structure design and a self-depressing valve seat design.

Academic collaboration

In June 2018, Chase Valve launched the real-time simulation equipment of the low-temperature/cryogenic valve, jointly developed by Chase Valve and Hefei General Machinery Research Institute. The real-time state monitoring and verification of the valve was achieved subsequently, which enables a more accurate simulation and analysis of accidents such as valve stem icing or frosting in LNG working conditions. In turn this method is helpful in avoiding serious leakages caused by icing after the valve has been installed.



Cryogenic testing at the production facility of Chase Valve.



Expertise from abroad: Massimo Zappettini from the Polytechnical University of Milan, Italy.



The future is digital

In addition to independent innovations, the Chase Valve R&D-team is also reaching out to academic organisations. Joining the School of Materials and Mechanical Engineering of Tsinghua University, Chase Valve has established the “Chase Valve Academic Workstation” and collaborates with authoritative academic figures such as Liu Baicheng, professor Huang Tianyou and associate professor Kang Jinwu of the Chinese Academy of Engineering.

Special casting material

All these academics will join the Chase Valve R&D-team to focus on researching alloys, the casting process and artificial intelligent simulation optimization. The first project for the workstation will be the development of triple-phase steel, a special casting material. “Currently the stainless steel on the market is mainly resistant to corrosion or to abrasion, while the high-alloy triple-phase steel can be corrosion-resistant and abrasion-resistant at the same time. Therefore it is suitable for more complicated working

conditions and has a wider range of application scenarios in the future,” Zeng Ruihong, the chief foundry engineer, explains. “We will start this collaborative research with Tsinghua University in April this year. We need to develop it in China to break the technical limitation that currently limits the production of the triple-phase steel to Japan only.” Although many domestic valves can achieve the same level of performance as imported valves, as Mr. Tianzhi claims, some overseas customers are not willing to purchase large-scale technical equipment from foreign branded manufacturers, making it more difficult for Chinese valve brands, especially emerging brands, to be successful in overseas markets.

Export focus

Chase Valve, however, is determined to compete not only in its domestic market. Mr. Tianzhi: “In the spirit of craftsmanship, Chase Valve relies on its product quality and technology innovation to seize the

global market. Our goal is to build Chase Valve into an international high-end intelligent valve manufacturing brand. We must expand our overseas markets while growing at high-speed in our domestic market!” With its independent R&D strength and global leading patent technology, Mr. Tianzhi acknowledges growth can also be realized by acquisitions. Recently, Chase Valve revealed plans to identify an acquisition target in Houston, USA. “Sufficient own funds, a flexible strategy and fast decision-making are our key strengths. When expanding overseas markets we must quickly catch up and overtake other rivals.”

Top-entry ball valve

At the 2018 Valve World Expo held in November 2018 at the Düsseldorf Exhibition Center in Germany, Chase Valve, as one of the main sponsors, displayed its LNG top-entry ball valve which was developed by its own R&D team. The presentation attracted a great deal of attention because of its unique design and performance in low-temperature environments. Chase Valve gained recognition from many professionals on the spot and started successful business dealings with many overseas companies such as ARMSIL of Poland, Petrouzinex of Romania, Sutech, AURUMPUMPEN of Germany, AKVEM of France, TAIYO NIPPON SANSO of Japan, TSK International Group, GENE BRE of Spain, etc. As one of the main sponsors, Chase Valve will also bring its latest independent R&D-insights and products to the 2019 Valve World America Expo and Seminar to be held in Houston, USA in June 2019, as well as the Valve World Asia Expo and Seminar to be held in Shanghai, China in September 2019. “We are looking forward to these events as these enable us to present our rapid progress to end users and the valve community in general,” concludes Mr. Tianzhi.

