New Trends of Die Casting Market in China

—A Commentary on the 5th China International Die Casting Exhibition

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The 5th China International Die Casting Exhibition, sponsored by Chinese Mechanical Engineering Society (CMES) and China Productivity Promotion Center of Machinery Industry, organized by Foundry Institution of Chinese Mechanical Engineering Society (FICMES) and China Productivity Promotion Center of Foundry Industry, was successfully held on June 28 to July 1, 2006 in INTEX Shanghai, China.

The exhibition had rich and colorful contents. The products exhibited were concerned with many fields, and the technological level was high. And the contemporary first-class products in the die casting industry worldwide were exhibited at the exhibition area of 10,000 m² by approx. 150 suppliers, purchasers and manufacturers in the die casting industry coming from eleven countries and regions such as China, Germany, Switzerland, Italy, Japan, Korea, Spain, USA, Canada, Hong Kong and Taiwan of China. The items on display included the products and technologies of die casting machines, melting and holding furnaces, auxiliary equipment, die casting dies, raw and auxiliary materials for die casting, high quality die castings, detection devices, cleaning equipment, etc. Some professional media and trade organizations were also attracted to join the exhibition.

Large quantities of domestic and overseas professionals in the die casting industry were attracted to visit the exhibition. During the three and a half days of the exhibition, more than 5,000 persons visited the exhibition.

1. Die Casting Machines

Most of the exhibition booths of die casting machines were at the first floor of the exhibition hall, occupying the largest part of the exhibition areas, which were the most attractive places. Twenty-eight die casting machine manufacturers at home and abroad participated in the exhibition, and about twenty die casting machines were on show. These manufacturers basically stand for the main stream of the production and sale of die casting machines, and they are the most active ones in China’s die casting market. The die casting machines on show are the main products of these manufacturers distributed in the China’s market.

Owing to the requirements for optimizing the die casting technology and improving the stability & high efficiency of die casting production process in the die casting market, the new-type die casting machines generally adopt the high performance injection systems and the real-time control technology. Such technologies as the visual operation interface, PLC electric control system, electro-hydraulic proportional control and servo control, multipoint injection speed setting, process monitoring have also been adopted by the new-type die casting machines and become the main stream technologies. Examples are the 125 ton magnesium alloy hot chamber die casting machine FCH 125M and the 220 ton horizontal cold chamber die casting machine FCC 200 displayed at the exhibition by Oskar Frech GmbH, Germany. These two die casting machines were assembled and made by Frech (Shanghai) Die Casting Machine Co. Ltd.

Frech (Shanghai) Die Casting Machine Co. Ltd. is a subsidiary company wholly owned by the Frech Group. The company produces FCH-Z series hot chamber die casting machines, FCC series cold chamber die casting machines and FCH-M series magnesium alloy die casting machines, which are assembled with the components and parts manufactured in Germany. They are more suitable for Chinese customers, since their performances and qualities are kept unchanged, but their prices are greatly reduced. The newly developed FCH-M series magnesium alloy hot chamber die casting machines (involving four types of them from 80 tons to 315 tons), which have been redesigned, have simple and compacted construction, and their production efficiency and performances are much better. The FCH-Z series hot chamber die casting machines (involving five types from 20 tons to 315 tons) are specifically designed for Chinese and Asian customers. Their control systems are improved, and some unnecessary functions of the hydraulic systems are simplified also. The FCC series horizontal cold chamber die casting machines (involving three types from 125 tons to 315 tons) employ the patented injection system ECOPRESS of Oskar Frech GmbH, and their performances are...
greatly improved. With this kind of die casting machines, the products with complicated shape and thin wall can be better produced, and high quality can be ensured for the products. Meanwhile, Frech (Shanghai) Die Casting Machine Co. Ltd. offers the imported Frech die casting machines and fitting parts, and the auxiliary devices such as die temperature control units, dosing furnaces, ladling units, and spraying tools.

For Bühler Equipment Engineering Co. Ltd., Switzerland, the hydraulic circuits of Bühler die casting machines are integrated, and the dat@net control system provides the comfortable operation. The dat@net control system is the core of the die casting unit, and it is a perfect overall solution to the technologies of logic, visualization, control and measurement. The 660 ton die casting machine Evolution B66D, was again exhibited by Bühler Equipment Engineering Co. Ltd. Bühler has three models of die casting machines, i.e. Classic B, Evolution B and Vision B. The locking forces of each model are from 260 tons to 4 200 tons. Classic B has merely injection cell D, which has small oil cylinder and a supercharger, that can meet all the requirements of normal die casting application. Evolution B has injection cell D or F. The injection cell F has no supercharger, but its diameter of injection cylinder is increased, and charging upon injection by using the accumulator to improve the working pressure, dynamic pressure and injection energy. The injection cell F can be suitable for producing thin wall die castings which require large dynamic mold filling pressure. Vision B has injection cell D, F or N. The injection cell N has the capacity of high pressure filling and supercharging, it can be used for semi-solid die casting or squeeze casting.

Müller Weingarten AG, Germany, is an old enterprise and does well in manufacturing large-sized die casting machines. The real-time control die casting machine OPTICAST of Müller Weingarten, incorporated with Vacurl’s vacuum gating system, is a wonderful tool for producing die castings which can be welded and heat treated. The die casting machine OPTICAST is equipped with the twin-circuit intensifying pressure build-up system and frequency-controlled pump drive system, and the patented Vacural technology adopts the vacuum suction die casting technology. Compared with the conventional vacuum die casting technology, the vacuum time in the Vacural process keeps longer.

The Japan Steel Works, Ltd. is the pioneer of magnesium injection molding machines. At the exhibition, the magnesium injection molding machine JLM 100-MGII, whose clamping force is 981 kN (100 tons), was displayed. With the machine, the magnesium thixomolding process can be conducted, where magnesium alloy raw materials in shape of flakes are first heated up, then injected molten metal into die cavity under the condition of no contact with air, with better fluidity and in the state of semi-solid slurry (i.e. in the state of thixotropy). The die casting machine BD-350V4-T was exhibited by Toyo Machinery & Metal Co. Ltd. of Japan. The BD-V4-T series die casting machines can meet all the requirements of the production of aluminum and magnesium alloy die castings required high strength pressure-tight products or super thin-wall. The operation performances and production capabilities are the key points of research and development for the BD-V4-T series die casting machines, and economic efficient and applicability are especially emphasized for them. In the Multi-Injection System employed, the cylinder output has no resistance force by controlling the oil volume, and thus the maximum pressure can be delivered to the products being manufactured.

The 530 ton die casting machine USH530iS was exhibited by UBE Machinery (Shanghai) Ltd., which was sold to Gaoyao GACE Casting Technology Co. Ltd. during the show. The machine adopts UBE’s special Impressive Injection System, S-DDV real-time feedback control, 2-ACC injection control, and mechanically interlocking valve, thus can start with no impact. The shot speed is 0.02-6 m/s, which can be altered at a high speed in 10 ms, and ten shot speeds can be set beforehand. UBE die-casting machines of this series have the characters of high speed clamping and flash free.

The die casting machine DC350-JX, which has the functions of injection control and monitoring, was exhibited by Toshiba Machine Co. Ltd., Japan. Due to their convenient operation and stable performances, Toshiba die casting machines are reputably commented by customers.

Idra-Idraprince Die Casting Machines Group was founded in 1946, it has manufactured over 13 000 die casting machines, and more than 9 000 of them are still running in good condition. During the exhibition, Idra showed such innovative technologies as two-platen machine design (the clamping device is assembled on the large pole), SLS intelligent spraying system (instantaneously infrared temperature measuring and automatically adjusting the spray mode of die lubrication), and SSR technology (semi-solid rheocasting, which is a retrofittable process that converts ordinary aluminum alloy into semi-solid slurry within a die casting cell).

Italpresse Industrie (Shanghai) Co. Ltd. is a subsidiary company of Italpresse Group, Italy, which mainly manufactures cold chamber and hot chamber high pressure die casting machines of different tons (from 200 tons to 4 500 tons). Hishinuma Machinery Co. Ltd. also participated in the exhibition, but none of its die casting machines was exhibited.

Six equipment exhibited by L. K. Group Shanghai Atech Machinery Co. Ltd. were the cold chamber die casting machine DCC350 (ordered by a Japanese customer), the hot chamber die casting machine DC8, the hot chamber die casting machine DC8, the hot chamber die casting machine of Technimie Ltd., Canada (ordered by a Taiwanese customer), the specialized machine PT-50C for light plates, the edge
trimmer QB-20, and the machining center VMC-510 (ordered by a customer in Shanghai). The first large-sized magnesium alloy die casting machine DCC2000M was developed and manufactured by L. K. Group, thus it was realized that the large-sized magnesium alloy die casting machine could be locally made in China henceforth. In order to expand its production, sales and service networks, L. K. Group has established eight affiliated branches, Hong Kong L. K. Machinery Co. Ltd., L. K. Machinery (Shenzhen) Co. Ltd., L. K. Machinery (Zhongshan) Co. Ltd., Shanghai L. K. Machinery Co. Ltd., Shanghai Atech Machinery Co. Ltd., Ningbo L. K., Shenzhen Leadwell Technology Co. Ltd., Shanghai Yiyang Hardware Co. Ltd.

The cold chamber die casting machine ZDC-420TPS exhibited by Ningbo Zitai Precision Machinery Co. Ltd., a Taiwanese capital company, was sold to one company in Dalian during the show. While Ningbo Zitai Precision Machinery Co. Ltd. is dedicated to improving the quality of its products, it has been continuously improving the comprehensive services covering consultancy before sale, after-sale service, and operation and maintenance training. It also provides services such as new plant planning, mould development, overall die casting operation techniques, even subsequent treatment processes. In addition, ZITAI also launched the die casting professional personnel training program which aims to help die casting companies solving their puzzles.

The cold chamber die casting machine PWC850 and the hot chamber die casting machine PWH160 were exhibited by PRO-WIN Machinery Co. Ltd., which were both sold to one company in Dongguan, Guangdong Province. The working pressure of the 800 ton or more tons cold chamber die casting machines made by the company is 17.5 MPa. The zinc alloy die casting machine SH-100 and SH-160 were exhibited by SIMHOPE Industrial Co. Ltd., Taiwan of China.

Yizumi Precision Die Casting Technology Co. Ltd. established in China mainland by Hong Kong Yizumi International Holding Co., Ltd., has imported die-casting machine design and manufacturing technology from foreign famous manufacturers for specialized research, development and manufacture of high quality and high performance die-casting equipment. The DM400-PC series die casting machine equipped with the SIEMENS industrial control computer was exhibited, which has perfect functions of intelligent measurement and control. The 500 ton die casting machine DC550C was exhibited by Shanghai Sanji Die-casting Machine Co. Ltd. For the machine, the C-type structure of high rigidity and high precision, and the double proportional control hydraulic system are adopted and the modular structure is used in PLC control. The PLC control system can test, display and store the curves of injection speed and pressure, and the technical parameters of die casting dies can also be stored. The machine can be remote controlled through the networks.

Zhejiang Wanfeng Technology Development Co. Ltd. is a professional manufacturer of special casting equipment including low-pressure die casting machine, differential pressure die casting machine, squeeze casting machine, inclinable gravity casting machine, air tightness tester, air-elimination refining machines, hydrogen-test apparatus, etc. The WFZJ458 low pressure die casting machine was exhibited, and parts of automobile wheel hubs, cylinder heads, and precision castings of aluminum and magnesium alloys were also on show.

In addition, other die casting manufacturers in our country such as Xuchang Eastpressure Machinery Co. Ltd., Ningbo Haitai Machinery (Group) Co. Ltd., Wuxi Xinjia Sheng Die Casting Machine Manufacture Co. Ltd., Jiangsu Shini Machinery Co. Ltd., Baoyang Machinery Co. Ltd., Dongguan Ruida Machine Co. Ltd., and so on, also exhibited their die casting machines which represent their most advanced technologies.

In the exhibition, a part of die casting machine dealers have booths, such as Canada Beta Die Casting Equipment Incorporation, which is a global supplier and dealer of second hand die casting machines and die casting related equipment; PVM Die Casting Machines GmbH, which sells, purchases and renovates the second hand die-casting machines and auxiliary equipment; Beijing Roiyoan Zhongxing Company, which is the agent specifically selling series of die casting machines of Spanish PRETRANSA Company; Shenzhen Amei Technology Co. Ltd., which transforms the common cold or hot chamber die casting machines into magnesium alloy die casting machines, and is also an agent in China selling die casting machines of Spanish PRETRANSA Company and Canadian Techmire Ltd.

2. Melting, Holding Furnaces and Auxiliary Equipment

Most of the die casting machine manufacturers participating in the exhibition produce their own mating automatic auxiliary equipment, including ladling devices, sprayers, extractors, lubrication devices, die temperature control units, and so on. Some of them even produce melting and holding furnaces. Six companies professionally producing die casting auxiliary equipment participated in the exhibition, they are Taiwan JS Automachine Co. Ltd., Dongguan Jinhiao (Jynial) Die Casting Equipment Factory, Taisheng Die Casting Equipment Factory, Shanghai Alumni Die Casting Technology Co. Ltd., Shanghai Wei Tuo Die Casting Machinery Co. Ltd., and Shanghai Zhongjie Automatic Device Co. Ltd.

Taiwan JS Automachine Co. Ltd. is a professional manufacturer producing automatic auxiliary equipment for die casting machines. The main products include ladling machines, sprayers, extractors, lubrication devices, rapid melting furnaces,
die temperature control units, vacuum units and central programming system for the entire die casting factory. In the exhibition, Taiwan JS Automachine Co. Ltd. displayed the JSEN automatic extractor which can extract workpiece of 3-4 kg, the JSEA automatic extractor which can extract workpiece of 2-20 kg, the JSHA mixer for mould release agent and the JSSS automatic sprayer with double lever jib. All the products of the company are controlled by PLC programs, and are matched for Toshiba, Toyo, Bühler, UBE, L.K., and all the die casting machine manufacturers in Taiwan.

In the exhibition, Shanghai Wei Tuo Die Casting Machinery Co. Ltd. exhibited eight equipment, including the lading devices with double lever jib, and with single arm, the sprayer with double lever jib, the stand-up sprayer, the extractor, the central type mixer, the one to one mixer and the granular machine. Dongguan Jinbiao (Jinyali) Die Casting Equipment Factory, founded in 2000, is a professional manufacturer in China producing aluminum melting and holding furnaces for varieties of cold chamber die casting machines.

ABB Engineering Co. Ltd. is the leading manufacturer of robots throughout the world. In the exhibition, the up-to-date IRB1410 and IRB1600 robots were exhibited. The IRB1600 robot is a nimble powerful backward robot, suitable for the 400 ton to 800 ton die casting machines, and its running speed is superior to that of any other robot of the same type.

Based on the advanced technology of Fanuc Ltd., Shanghai-Fanuc Robotics Co. Ltd. has strong power of engineering integration and technical services, and can provide customers high performance products, advanced and reliable technical solutions, and perfect technical services. In the exhibition, the intelligent robots LR Mate 200iB, ARC Mate 120iB, M-710iC/50, R-2000iA/165F, and P-50i which can offer accurate and reliable solutions of spraying were displayed.

The magnesium alloy dosing furnace made by Striko Westofen GmbH consists of two separate furnace bodies which are connected with each other through a perfusion tube and can ensure the temperature of pouring furnace to keep constant. The dosing accuracy of the dosing pump is up to 1%, apparently reducing wastes. The interval of dosing pump cleaning is up to two months, being superior to other pumps currently in use.

Tool-Temp AG, Switzerland, is the largest manufacturer of die temperature control units and water chilling units in Europe. It has established six sales & service departments in China. In the exhibition, the die temperature control unit TT-380/2 was on show, which has two loops consisted of two separate circulating oil circuits.

The other exhibitors providing such products as mentioned above also include Shohei Industrial Heating Equipment Shanghai Co. Ltd., Regloplas Shanghai Co. Ltd., DAEHAN Engineering (Suzhou) Co. Ltd., Shenyang NEU-SANKEN Industrial Furnace Manufacturing Co., Ltd., Wollin GmbH, etc.

3. Die Casting Dies

Owing to the development of die casting industry in our country, the mould market has great potential. There are about 100 die casting die manufacturers in China; the more rapidly developed areas are Zhejiang and Guangdong provinces. Most of the production enterprises can independently develop, design and manufacture die for die castings.


Heck & Becker is a worldwide leading supplier of large-sized high-pressure die casting dies. It not only provides the dies of automobile parts and components for many world well-known auto enterprises such as GM, Ford, VW, Daimler Chrysler, BMW, Audi, PSA, and Citroen, but also is the important mould supplier for the world-famous foundry enterprises such as Alcoa, ZF, GF, KS, Honel, etc. Heck & Becker has over 60 years of experiences in designing and manufacturing large die casting dies of cylinder blocks of automobile engines, transmission cases, instrument panels, structural die castings of automobiles and car bodies.

The accuracy of mould manufacturing in Nihon Seiki Co. Ltd. can approach the high level of microns. For the company, CAD/CAM system has been introduced for a long time, and the monitoring is adopted for the entire manufacturing process from mould design to die castings production.

Shanghai Delex Mould Co. Ltd. is a high-qualified supplier of die steels, dies and die carriers. Delex is the general agent in China of the best brand of hot work steel in Germany of Kind & Co Edelstahlwerk.

4. Die Castings

With the integration of global economy and the continuous development of Chinese economy, many world-famous manufacturers take the strategies of global purchasing; they are continuously enlarging the procurement of die castings produced in China. Some international magnates such as Ford, GM, Toyota, Honda, etc. clearly expressed to buy automobile
parts, components, and cars from China.

A great number of die castings production enterprises participated in the exhibition; they showed not only their elaborate die castings, but also their advanced die casting technology and experiences. The main exhibitors and some exhibitors about diecastings can be seen on the pages of 237~242 in the third issue of 2006 China Foundry journal.

5. Others

The cleaning equipment such as hanger abrators, passage abrators, rotary table abrators, and vibratory polishing machines has also been developed, and the manufacturers are mainly concentrated in Wuxi and Qingdao, China. The painting and coating equipment can also be produced by some enterprises. Such enterprises as Wuxi Conly Blast Equipment Co. Ltd., Qingdao Huanghe Xincheng Casting Machinery Co. Ltd., Wuxi Huazhong Finishing Equipment Plant, Wuxi Taiyuan Machine Building Co. Ltd., Shanghai Prex MFG. Co. Ltd., etc. participated in the Exhibition. Although the materials and production technology of the impellers of domestic shot-blasting equipment have already approached the advanced international level, the service life of domestic impellers still cannot keep up with that of the foreign products.

In the exhibition, there were so many companies professionally producing, selling test equipment and affording services of testing. The main companies taking part in the exhibition included Shanghai Orient NDT Equipment Company, Ahresty Techno Service Corporation, National Quality Supervision & Test Center of Foundry & Metalforming Machinery, Shanghai Sanaru Co. Ltd., Dandong AoLong Supervision & Test Center of Foundry & Metalforming Machinery, Shanghai Sanaru Co. Ltd., Dandong AoLong Radiative Instrument Co. Ltd., De Hua Materials Testing Co. Ltd., and the QC tester Web.

As far as die lubricants are concerned, the foreign capital or joint-venture companies participating in the exhibition included Hanano Die Casting Coating (Shanghai) Co. Ltd., Hutternes-Albertus Chemische Werke GmbH, Acheson (Japan) Ltd. Shanghai Branch, Shanghai Petrofer Special Lubricating Agent Co. Ltd., Jaeger Oil & Chemical Co. Ltd., and Wuxi Moretex Technology Co. Ltd. The domestic die casting lubricant producers included Yixing Jinzhen Foundry Molding Materials Co. Ltd., Changchun Liyuan Lubricant Factory, Dongguan Pacoll Lubricant Co. Ltd., and so on.

Yixing Jinzhen Foundry Molding Materials Co. Ltd. is the first producing lubricating particles for die casting plungers in China. Changchun Liyuan Lubricant Factory produces series of Huiyang brand releasing agents for dies, lubricating oils for plungers, and anti-welding waxes. DAEHAN Engineering (Suzhou) Co. Ltd. runs not only the businesses of melting and holding equipment, but also the businesses of DHECO series releasing agents and lubricants. Ultraceal Shanghai Limited is a subsidiary company of Ultraceal International, United Kingdom. The impregnation technology and products of Ultraceal are in the leading place in the impregnation fields all over the world. The B Series VTS-based (Vertical Transfer System) top-loading impregnation equipment was exhibited, and it was sold to Kodak Precision Engineering Co. Ltd. during the show. The equipment can efficiently complete the whole process of aqueous washing, vacuum drying, impregnation, cold washing, and hot cure for castings, and can reclaim effectively the sealants. Ultraceal International has developed a premium recyclable sealant REXEAL 100, the effective usage of which can approach more than 95%.

Chuo Hatsumei Institute Co. Ltd. is a comprehensive directing company of the impregnation technology. By using a special impregnation equipment, the invisible porosity that occurs in the casting process can be filled and cured by a kind of resin (impregnant).

Sanshin Ind. Co. Ltd. has the worldwide first-class technologies of aluminum melting, recycling and recovery, and can produce the high speed dross treatment machines.

AnyCasting Co. Ltd. is specifically dedicated to develop casting CAE softwares for simulation analysis of castings and offering consulting services on casting technologies. The headquarters is located in Seoul, Korea and a representative office has been established in Shanghai, China. AnyCastingTM, the core product of AnyCasting Co. Ltd., is a new-generation advanced casting simulation software based on the Windows operation system, which can help customers rapidly and accurately simulate the whole processes of melt filling and solidification, and predict the possible casting defects, thus reducing the costs and time.

6. Complements

Improving the quality of die castings is the everlasting subject of die casting. The quality of die castings involves many aspects such as the dimensional accuracy of castings, casting defects, mechanical properties, microstructures, surface conditions, and so on.

At present, many small-sized and medium-sized die casting enterprises in our country survive relying merely on meager profits, and low level competition. Nevertheless, in order to facilitate the long-term development and get high profits, the enterprises must emphasize on the basic technologies, and learn the abroad advanced technologies of die casting machines, and then perform continuously the technological innovation, and adopt the advanced techniques to produce high value-added and unique products. The enterprises also must break through the bottleneck of mould manufacturing which is the footstone of die casting, and employ the technologies of alloy filtration, vacuum die casting, die temperature control, and PC real-time control of die casting parameters. In addition, they also should continuously improve the level of die casting opteration to meet actively the market competition.