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Automotive Integrated Die Casting Industry Report, 2024

Apr. 2024

Integrated Die Casting Research: adopted by nearly 20 OEMs, integrated die casting gains popularity

Automotive Integrated Die Casting Industry Report, 2024 released by ResearchInChina summarizes and studies the status quo of integrated die casting industry and the industry chain products layout of OEMs and suppliers, and predicts the future development trends of the integrated die casting industry.

1. Multiple breakthroughs have been made in the integrated die casting upstream supply chain (die casting machines, molds and non-heat-treatable materials).

Super-large die casting machine: At present, the tonnage of super-large die casting machines has been increased from 6000T to 16000T, and die casting machine suppliers are developing 20000T die casting machines.

Large die casting machines are the basis for automotive integrated die casting. Generally speaking, integrated die casting requires die casting machines with >6000T clamping force. Currently, only IDRA, Brown, Boveri & Cie, L.K. Technology, Haitian Die Casting and YIZUMI can produce 6000T die casting machines. In October 2023, L.K. Technology unveiled a 16000T super-large intelligent die casting unit, making a breakthrough in clamping force increased from 6000T to 16000T in only three years. It is the largest die casting machine in the world so far, and is expected to cover class A0-C and SUV models.

16000T Super-large Intelligent Die Casting Unit of L.K. Technology



Source: L.K. Technology

Now, Tesla, L.K. Technology and Haitian Die Casting among others have started deploying and developing >20000T die casting machines.

In June 2023, Haitian Die Casting and Chongqing Millison Technologies announced that they would jointly develop 20000T super-large die casting machines.

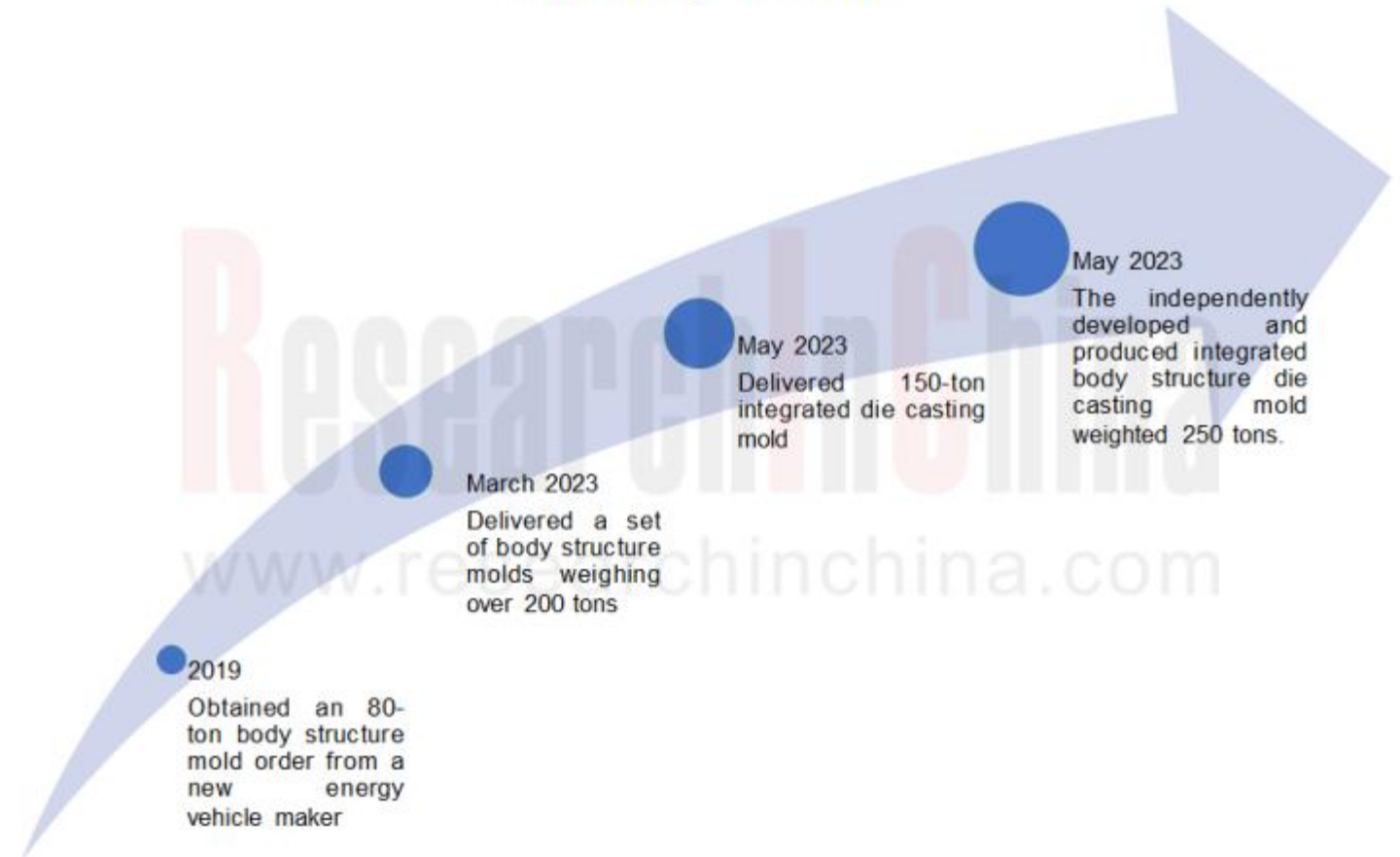
In December 2023, L.K. Technology and Neta Auto signed a strategic cooperation agreement on joint R&D of >20000T super-large die casting equipment to expand the application of integrated die casting to the chassis of class B vehicles.

Integrated die casting mold: At present, the self-weight of an integrated die casting mold has exceeded 250 tons

Before 2023, in China only a few mold manufacturers such as GZDM Technology, Ningbo Sciveda Mould (SWD), and ZDM (Zhenzhi) Machinery & Mould had the capacity to produce ultra-large integrated molds. However quite a few companies including Chongqing Millison, Rayhoo Motor Dies, Chongqing Borun Mould Manufacturing and Ningbo Xinlin Mould Technology can produce super-large molds now. Although HLGY and Qixin Mould have yet to mass-produce actual products, they are vigorously making layout.

From the perspective of mold technology, significant breakthroughs have been made in R&D of integrated die casting molds. In 2019 when only having experience in producing 50T molds, ZDM (Zhenzhi) Machinery & Mould secured an order from a new energy vehicle company for a body structure mold weighing 80 tons, which was the largest mold in the world at that time. The integrated body structure die casting mold self-developed by Ningbo ZDM in May 2023 weighs 250 tons and can assist OEMs in integrated die casting of front and rear chassis. From 50T and 80T to current 150T, 200T and 250T, ZDM (Zhenzhi) Machinery & Mould has kept breaking records.

Integrated Die Casting Mold Delivery History of ZDM (Zhenzhi) Machinery & Mould



Source: ResearchInChina

Non-heat-treatable materials: domestic manufacturers have embarked on non-heat-treatable materials by way of patent licensing, independent R&D, and cooperation with universities or automakers, accelerating localization.

The composition of non-heat-treatable materials is complex. First movers have obvious advantages. Alcoa and Rheinfelden announced their non-heat-treatable materials as early as the 1990s, while China's first entrant Lizhong Group stepped into the market in 2020. Nowadays, many manufacturers and universities in China, such as Shanghai Yongmaotai Automotive Technology, Hubei Xinjinyang, Weiqiao Pioneering, Suzhou Huijin Smart Technology, Xiaomi, Shanghai Jiao Tong University and Guangdong Hongtu Technology, have acquired non-heat-treatable materials patents by way of independent or cooperative R&D.

In August 2023, Xiaomi Automobile secured a non-heat-treatable material patent for "Xiaomi Titans Metal", its self-developed alloy material.

Xiaomi's Non-heat-treatable Material - Xiaomi Titans Metal

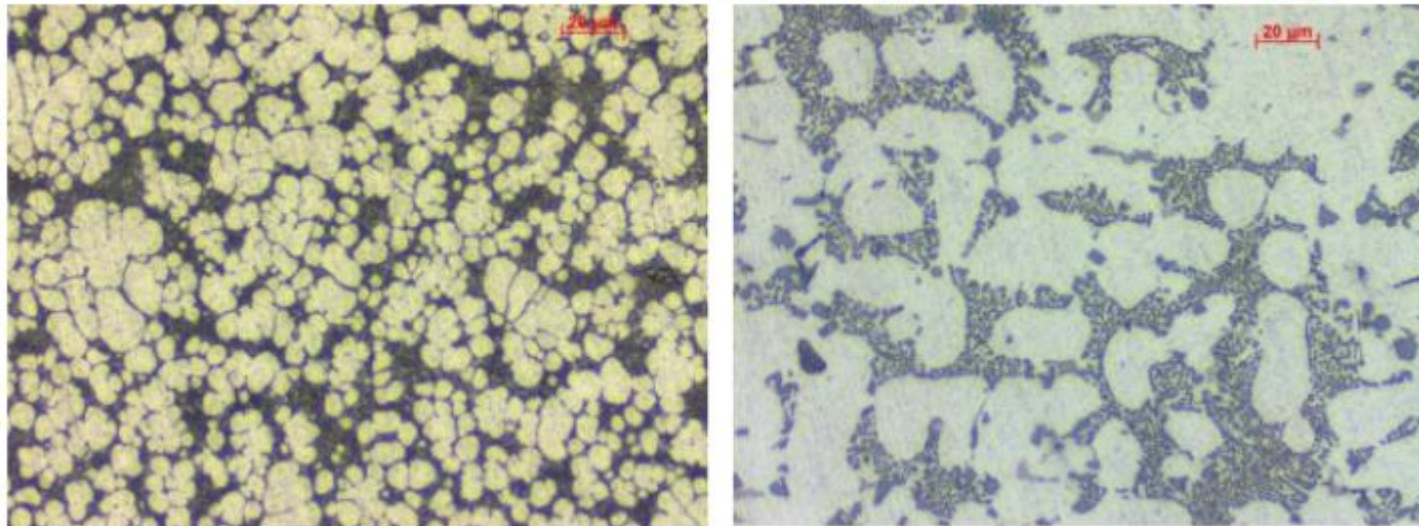


Source: Xiaomi Automobile

"Xianjing" (fiber crystal)

In November 2022, "Xianjing" (fiber crystal), a new non-heat-treatable high-strength high-toughness aluminum alloy material co-developed by ZEEKR and Suzhou Huijin Smart Technology Co., Ltd., officially came into production.

Xianjing High-performance Non-heat-treatable Material Co-developed by ZEEKR and Suzhou Huijin Smart Technology



Source: Huijin Smart Technology

2. Application of integrated die casting in vehicle body: from rear underbody to front cabins, middle integrated die cast parts and battery trays.

Since Tesla used a 6000T die casting machine to mass-produce the rear underbody assembly for Model Y for the first time in 2020, other automakers in China such as NIO, Xpeng, Li Auto, Xiaomi, ZEEKR, AITO and Neta have also laid out integrated die casting. At present this technology has been adopted in multiple models, and finds application in front cabins and middle integrated die cast parts in addition to rear underbodies.

As of April 2024, integrated die casting had been used in mass production of rear underbodies, front cabins and middle integrated die cast parts and battery trays, as shown below:

Rear underbody: Chinese emerging carmakers have gradually realized the mass production of integrated die cast rear underbodies for models such as NIO ET5, Xiaomi SU7, ZEEKR 009/007/ New ZEEKR 001 and AITO M9.

Front cabin: some automakers can mass-produce front cabin components for models such as new NIO ES8 and Xpeng G6/X9.

Middle integrated die cast parts: the middle integrated die cast parts for ZEEKR 001 FR has been mass-produced.

Battery tray: L.K. Technology has mass-produced the world's largest integrated battery tray, which is about 2180*1500*110 in size.

Using Integrated Die Casting Technology and Their Implementation Methods

Some Automakers' Models Using Integrated Die Casting Technology and Their Implementation Methods

Automaker	Integrated die casting Applied Models	Time To Market	Application Location of Integrated Die Casting
Tesla	Model Y	October 2021 (The application time of the mass production technology in vehicles)	Front cabin, rear underbody
NIO	NIO ET5	Dec 2021	Half-piece rear underbody
	NIO ES7	June 2022	All-aluminum rear subframe
	New NIO ES8	December 2022	Front and rear integrated die-cast aluminum bodies
Xpeng	Xpeng G6	June 2023	Front and rear integrated aluminum die-casting
	Xpeng X9	January 2024	
Li Auto	Li MEGA	March 2024	Rear underbody frame
Xiaomi	Xiaomi SU7	March 2024	Rear underbody
ZEEKR	ZEEKR 001 FR	October 2023	Rear aluminum body, mid-section integrated die-casting
	ZEEKR 009	Nov 2022 (The time to market of the earliest model using the technology)	Rear aluminum body
	ZEEKR 007	December 2023	
	Brand New ZEEKR 001	February 2024	
AITO	AITO M9	December 2023	Front tower package, front longitudinal beam torsion joint, A-pillar, C/D-pillar, rear underbody

Source: ResearchInChina

Integrated die casting will cover battery case upper cover, middle floor, and underbody assembly in 2027

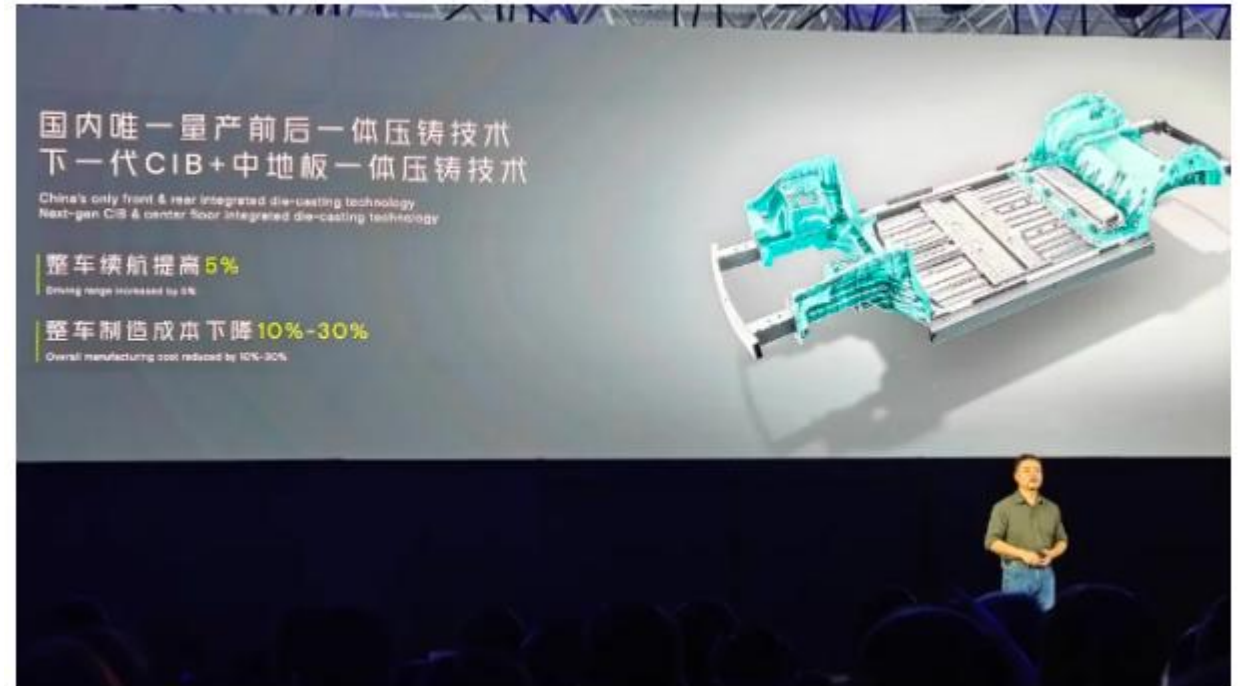
It is expected that integrated die casting will cover battery case upper cover, middle floor, and underbody assembly in 2027. Tesla, FAW and Xpeng already have plans:

Tesla: it plans to replace the 370-component underbody assembly with 2-3 large die cast parts in 2025. The weight will be reduced by 30% and the manufacturing cost by 40%.

FAW: in November 2023, the integrated die casting super factory of FAW Foundry Co., Ltd. planned to build a new 9000T die casting unit and processing line. The project mainly produces integrated front cabins, rear underbodies and CTC battery case upper covers for Hongqi's new models E802 and EHS9. With the annual capacity of 85,700 die-cast parts, it is expected to be completed in June 2024.

Xpeng: in October 2023, He Xiaopeng revealed that the internal team was pre-researching the next-generation CIB + center floor integrated die casting technology and expanding a 16000T die casting machine which can produce larger die cast parts, such as large-size battery case.

Xpeng Pre-researches the Next-generation CIB + Center Floor Integrated Die Casting Technology



Source: Xpeng

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