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China Automotive Integrated Die Casting Industry Research Report, 2022

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Integrated Die Casting Research: Upstream, midstream and downstream companies are making plans and layouts in this booming field

Automotive integrated die casting is an automotive manufacturing process proposed and put into practice by Tesla. It redesigns and highly integrates multiple separate and scattered small parts in the original design, then uses a large die casting machine to perform high-pressure die casting at one time, and directly produces a complete large part without the welding process. Compared with traditional automotive manufacturing, automotive integrated die casting has advantages in manufacturing cost, production efficiency, labor cost, model development cycle, performance, materials recycling, etc.

Against the traditional concept that product and process design hinges on the existing conditions and capabilities, Tesla prefers reverse thinking. Taking automotive integrated die-casting as an example, Tesla determines how large the part can be to achieve the best effect, then deduces how much equipment, tooling and materials are needed. Afterwards, it cooperates with suppliers to develop new equipment, corresponding molds, materials and new processes. This kind of thinking has greatly inspired the innovation of the traditional industry and brought upheaval and the secondary innovation to the industry.

OEMs master the know-how of integrated die casting through independent research and development

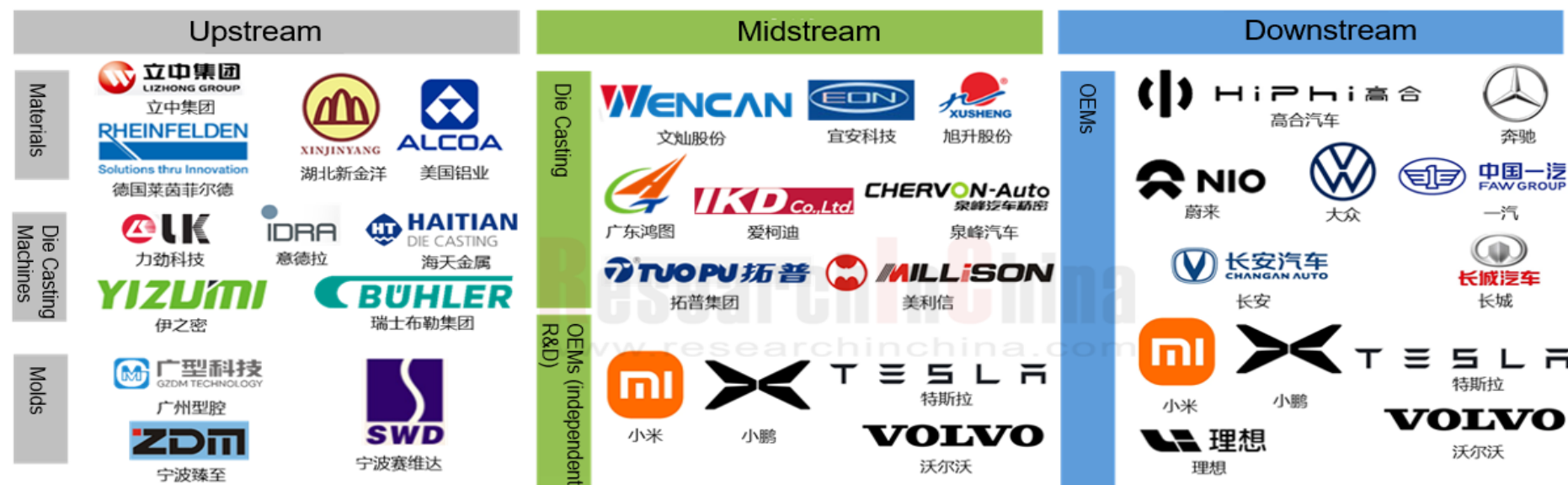
After Tesla Model Y adopted the integrated die casting process for the first time, a new wave of integrated die casting has staged worldwide. A complete industrial chain layout has been formed between upstream die casting machine manufacturers, material manufacturers and mold manufacturers, as well as midstream die-casting companies and downstream automakers.

There are currently two main business modes:

- **Independent research and development of OEMs:** OEMs: directly purchase die casting machines, molds and materials, and then build their own factories to produce die casting parts. Tesla, Xpeng and Volvo adopt this mode.
- **Procurement:** OEMs directly purchase die casting parts from die-casting manufacturers who buy relevant materials to produce die casting parts and deliver them to OEMs. HiPhi, NIO and Li Auto follow this mode.

In the long run, automotive integrated die casting will gradually return to the procurement mode. OEMs have to invest heavily in building their own production lines, and they may be extremely concerned about the later operation and management. Tesla, the representative of the independent R&D mode, has cooperated with die casting manufacturers in order to add new capacity by outsourcing in the future. The main purpose of the OEM's self-research is to master the know-how of integrated die-casting, which is convenient for technical communication with suppliers in the future.

Automotive Integrated Die Casting Industry Chain Layout








Source: ResearchInChina

Upstream: Super-large die casting machines debuted, helping vehicle-level integrated die casting

Large die casting machines are the key to realizing automotive integrated die casting. At present, integrated die casting requires 6000T (or above) die casting machines. Globally, IDRA (a wholly-owned subsidiary of L.K. Technology), Bühler Group, as well as China-based L.K. Technology, Haitian Die Casting and Guangdong Yizumi can produce die casting machines over 6000T.

Higher-tonnage die casting machines can facilitate breakthroughs in die casting size and structure. Now, Tesla, L.K. Technology, Guangdong Hongtu, Haitian Die Casting and other companies have started research and development of die casting machines above 12,000T. In September 2022, L.K. Technology and Guangdong Hongtu successfully released a 12,000T super-large intelligent die casting unit jointly, marking the advent of world's highest-tonnage die casting machine. This is expected to boost vehicle-level integrated die-casting.

Major Large Die Casting Machine Manufacturers Worldwide












	Vendors	Key partners/customers	Product series	Clamping force (tons)
Domestic	 L.K. Technology	Tesla Wencan Group Tuopu Group Guangdong Hongtu Great Wall Precision	IMPRESS & D-Series	1300-12000
	 Guangdong Yizumi	Yunhai Special Metals FAW Changan	DM-H	4500-9000
	 Haitian Die Casting	Ningbo Xusheng Auto Technology Millison	HDC	180-8800
Overseas	 IDRA	Tesla	GIGA PRESS OLS	5500-9000 420-4000
	 Bühler Group	Dongguan Eontec Volvo Volkswagen IKD Handtmann	Fusion	340-9200

Source: ResearchInChina

Midstream: Die casting leaders emerged

As midstream die-casting companies, Wencan Group, Tuopu Group, Guangdong Hongtu, Xusheng Auto Technology, Millison, etc., have deployed automotive integrated die casting by purchasing large die casting equipment and cooperating with automakers.

Layout of Major Die Casting Companies in Automotive Integrated Die Casting

Enterprises	Large die casting equipment	Cooperative equipment manufacturers	Automakers supported
 Wencan Group	2 sets of 6000T equipment, 2 sets of 7000T equipment, 3 sets of 9000T equipment	L.K. Technology	NIO Li Auto
 Tuopu Group	6 sets of 7200T equipment	L.K. Technology	HiPhi
 Guangdong Hongtu	A set of 6800T equipment. In addition, a total of 8 sets of large intelligent die casting units (including 12000T equipment) were purchased from L.K. Technology	L.K. Technology	Xpeng BYD (in contact) Tesla
 Ningbo Xusheng Auto Technology	It will order about die casting island equipment (1300T-4500T, 6600T and 8800T models) worth RMB200 million with Haitian Die Casting in the next three years	Haitian Die Casting	-
 Chervon-Auto	A set of 6000T equipment, a set of 8000T equipment	-	-
 Dongguan Eontec	1 sets of 6100T equipment	Bühler Group	-
 Millison	2 sets of 6600T equipment, 3 sets of 8800T equipment	Haitian Die Casting	-
 Jiangxi Senping Technology	6000T, 9000T, 12000T	L.K. Technology	-
 Asiaway Group	A total of 6 sets of LK 6600T and 9000T super-large intelligent die casting units are planned and deployed	L.K. Technology	-
 IKD	IKD plans to purchase 45 die casting machines in 2022, including two 6100T machines and two 8400T machines	Bühler Group	-
 Yunhai Special Metals	2 sets of 6800T equipment, 2 sets of 7000T equipment	L.K. Technology Guangdong Yizumi	-

Currently, Wencan Group, Tuopu Group and Guangdong Hongtu have first-mover advantages in experience accumulation and order intake. All three have established cooperation with automakers and successfully completed the trial production of integrated die casting parts. Especially, Guangdong Hongtu is superior to others thanks to its heat-treatment-free aluminum alloy patent and the yield rate of 85%-90%. So far, it has not only obtained the designation from Xpeng, but also become Tesla's only die casting partner in integrated die casting.








Downstream: Automakers scramble to deploy integrated die casting in a bid to integrate the upper and lower car body

At present, Tesla, NIO, Xpeng, HiPhi, Volvo, Great Wall and other automakers have made layout in the field of automotive integrated die casting.

In terms of emerging automakers, Tesla has officially delivered Model Y with integrated die casting floors. NIO ET5 with an integrated die casting rear subframe is about to be delivered. In addition, Xpeng, Li Auto and HiPhi have put integrated die casting on the agenda, and they may apply it to vehicles in 2023.

As for traditional automakers, Volkswagen and Volvo have a long-term timetable for the layout of integrated die casting, and they expect to achieve mass production around 2025. Chinese automakers Changan and Great Wall have started bidding for integrated die casting projects, and they are likely to accomplish mass production in the next two to three years.

Integrated Die Casting Layout of Some Automakers Worldwide

OEMs	Layout modes	Models deployed	Die casting machine suppliers	Mold suppliers	Die casting suppliers	Materials suppliers
 Tesla	Self-built + procurement (planned)	Model Y, Cybertruck	IDRA / Bühler Group (planned)	SWD	Tesla	Alcoa
 NIO	Procurement	ET5, ES7	L.K. Technology	GZDM Technology	Wencan Group / Millison	CSMET (Alcoa)
 Xpeng	Self-built + procurement	New platform models in 2023	L.K. Technology	GZDM Technology	Guangdong Hongtu	Guangdong Hongtu / Lizhong Group (estimated)
 Li Auto	Procurement	W platform models	L.K. Technology	Wencan Mold (estimated)	Wencan Group	Lizhong Group (estimated)
 HiPhi	Procurement	Upcoming new models	L.K. Technology	-	Tuopu Group	Shanghai Jiao Tong University
 Volvo	Self-built	New models after 2025	Bühler Group	-	-	-
 Great Wall	Self-built	-	L.K. Technology	SWD	Great Wall Precision	Lizhong Group

Source: ResearchInChina

Now, major OEMs mainly apply integrated die casting to the rear floor, the front cockpit, etc. With the advent of higher-tonnage die casting machines, integrated die casting is expected to spread to lower body assembly, upper body integrated casting parts, and even body-in-white in the future.

Tesla Body + Battery Integrated Die Casting Solution

Tesla plans to replace the 370-part lower body assembly with 2-3 large die casting parts. Tesla has extended the integrated die casting to the front and rear floors. At the same time, the upper cover of the battery pack and the middle floor of the vehicle are combined into one for integrated die casting, which can reduce the vehicle weight by 10% and increase the cruising range by 14%.

Tesla's Body + Battery Integrated Die Casting Solution

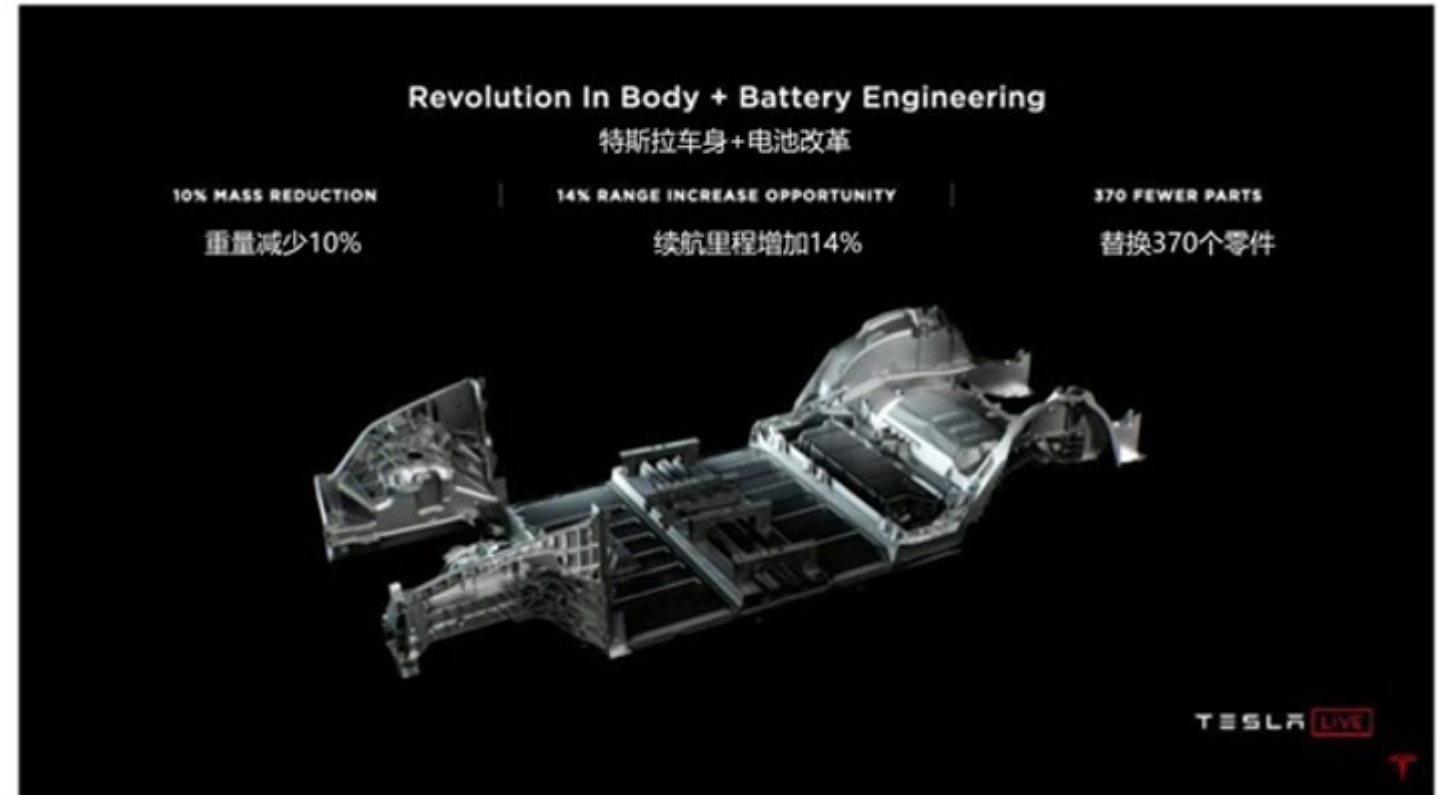


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