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**Commercial Vehicle Industry  
Intelligent Chassis Report, 2023**

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Commercial Vehicle Intelligent Chassis Industry Report, 2023, released by ResearchInChina, combs through and researches status quo and related product layout of OEMs and suppliers, and predicts future development trends of commercial vehicle intelligent chassis.

China-SAE defines intelligent chassis as a platform that provides bearing for autonomous driving system, cockpit system, and power system, with capabilities of cognition, prediction, control of interaction between wheels and the ground, and management of its own operating state, and specifically a system implementing vehicle intelligent driving tasks. Referring to the Electric Vehicle Intelligent Chassis Technology Roadmap, currently the development of commercial vehicle intelligent chassis in China focuses on four components, namely, brake-by-wire, steer-by-wire, drive-by-wire, and intelligent suspension. In the trend for commercial vehicle electrification, connection and intelligence, intelligent chassis, as a development cornerstone of vehicle intelligence, has become a development priority of the industry.

## Commercial Vehicle Intelligent Chassis Development Goals

	2025	2030
Product Goal	<ul style="list-style-type: none"> <li>Cover low-speed, closed operation scenarios</li> <li>Realize <b>conditional driving automation</b></li> <li>Reduce TCO by 10%</li> </ul>	<ul style="list-style-type: none"> <li>Cover highway and open operation scenarios</li> <li>Realize <b>high driving automation</b></li> <li>Reduce TCO by 40%</li> </ul>
Technology Goal	<ul style="list-style-type: none"> <li>Distributed control / chassis domain control</li> <li>Multi-sensor chassis</li> <li><b>Lateral and longitudinal integrated control</b></li> <li>Single point of failure, function failure degradation</li> <li><b>Separation of software and hardware</b></li> </ul>	<ul style="list-style-type: none"> <li>Chassis domain control</li> <li>Multi-sensor information fusion for chassis</li> <li><b>Lateral, longitudinal and vertical integrated control</b> for chassis</li> <li>Single point of failure, <b>full function failure redundancy</b></li> <li><b>OTA</b></li> </ul>
Corporate Goal	<ul style="list-style-type: none"> <li>Core components and sub-systems of Independent brands dominate in intelligent chassis</li> </ul>	<ul style="list-style-type: none"> <li>Independent suppliers have international leading brand impact in intelligent chassis</li> </ul>
Market Goal	<ul style="list-style-type: none"> <li>30% market share of vehicles equipped with intelligent chassis</li> </ul>	<ul style="list-style-type: none"> <li>60% market share of vehicles equipped with intelligent chassis</li> </ul>
Industry Chain Goal	<ul style="list-style-type: none"> <li><b>Key components and core subsystems form an independent and controllable industry chain</b></li> </ul>	<ul style="list-style-type: none"> <li>Key components and core subsystems form a <b>complete</b> independent industry chain</li> </ul>

Source: Electric Vehicle Intelligent Chassis Technology Roadmap

## 1. OEMs and suppliers accelerate layout of intelligent chassis

Driven by national policies and market demand, OEMs and suppliers have quickened their pace of deploying intelligent chassis to solve the current problem of "insufficiently flexible limbs" in commercial vehicle chassis and support intelligent upgrade of commercial vehicle chassis.

In 2023, a light commercial vehicle based on skateboard chassis of Farizon Auto (Top 2 in new energy light trucks) will be launched on market in small batches. SuperVAN, Farizon Auto develops using skateboard chassis technology, covers vehicles with gross mass of 2.5 to 5.5 tons, length of 4.5 to 6 meters, and height ranging from flat roof (1.98 meters) and medium roof (2.18 meters, capable of entering underground garages) to high roof (2.5 meters).

## GMA X-by-wire Intelligent Architecture of Farizon Auto



Source: Farizon Auto

## Qingling Motors' New Generation Light Electric Truck M600

In May 2023, Qingling Motors first introduced its new-generation light electric truck, M600. The commercial vehicle skateboard chassis technology used in the new vehicle integrates three major components of battery, motor, and ECU, as well as drive/steer-by-wire and thermal management in the chassis according to three major domains, bringing much lower redundancy.



Source: Qingling Motors





# Breakthroughs are made in electronic hydraulic brake-by-wire systems for commercial vehicles

## 2. Breakthroughs are made in electronic hydraulic brake-by-wire systems for commercial vehicles

Commercial vehicles with large loads have high requirements for braking systems: large braking force, high system reliability requirements, and high control difficulty due to large variation in load. Originally commercial vehicles mainly used air brake systems, but hydraulic brakes find ever broader application in light commercial vehicles, for offering benefits of quick braking response, short braking distance, low cost, a small number of parts, lighter weight, and low maintenance.

Application of brake-by-wire in commercial vehicles started from electronic braking system (EBS). As early as 1996, WABCO's EBS was used in Mercedes-Benz ACTROS series commercial vehicles. In recent years, electronic hydraulic brake-by-wire systems have also been mass-produced and installed in commercial vehicles. In China, typical suppliers are Tongyu Auto, Trinova Auto, and Tsintel Technology.

## Commercial Vehicle Electronic Hydraulic Brake-by-wire Products

EHB product for commercial vehicles	Tongyu Auto		Trinova Auto		Tsintel Technology
	TYEHB-T185	TYEHB-T1120	TBS450	TBS600	TIB
Product picture			 (For specific design, please refer to different product models)		
Diameter of master cylinder	25.4, 26.99 28.58mm	28.58, 30.16 31.75, 33.33mm	26.99, 28.57, 30.16, 31.75mm		/
Stroke of master cylinder	42mm	42mm	/	/	/
Maximum brake pressure	130-150bar	140-180bar	≥150bar		/
Pressure building time to 100bar	≤200ms	≤250ms	≤300ms		/
Decoupled or not	Yes	Yes	Yes	Yes	Yes
Adjustable pedal feeling	Yes	Yes	Yes	Yes	Yes
Applied model	3~4.5t commercial vehicles	4.5~7.5t commercial vehicles	4.5t light truck	6t light coach	Commercial vehicles within 4.5t

Source: ResearchInChina

# Standardized intelligent chassis matches upper bodies of differing loads according to commercial vehicle application scenarios

Tongyu Auto is incubated by Tongji University, and its core team has independently developed core chassis-by-wire technologies since 2012. It has gained capital investment from OEMs such as Dongfeng, BAIC, China South Industries Group Corporation (CSGC), and Xiaomi. Among them, Xiaomi has successively participated in its A+ and B funding rounds.

In Tongyu Auto's commercial vehicle products, large EHB platform products are applicable to 3t to 7.5t mini trucks, mini coaches, pickups, light trucks, light buses and minibuses; combined braking system solutions can also cover vehicles with load capacity of 12t, further meeting the application requirements of medium-sized trucks and coaches. At present, Tongyu Auto's products have supported dozens of Chinese OEMs, such as FAW Jiefang, Dongfeng, JAC, JMC, SANY Heavy Industry, BAIC Foton, Yutong Group, XCMG, and King Long. Tongyu Auto ranks first in the Chinese commercial vehicle brake-by-wire EHB market.

### 3. Standardized intelligent chassis matches upper bodies of differing loads according to commercial vehicle application scenarios

Standardized intelligent chassis matching intelligent cabins and scenario-based upper bodies at random meets the requirements of different commercial vehicle scenarios.

**Standardized chassis.** Meet requirements of large-scale production for product standardization and reduce production cost. Moreover standardized chassis provides technical support for the development of commercial vehicle sharing.

**General cabin.** An intelligent cabin can be connected to a variety of standardized intelligent chassis via specific standardized mechanical interfaces, so as to realize plug-and-play.

**Scenario-based upper body.** Upper body is customized according to scenarios to differentially meet specialized needs of scenarios and maximize usage efficiency in the scenarios.

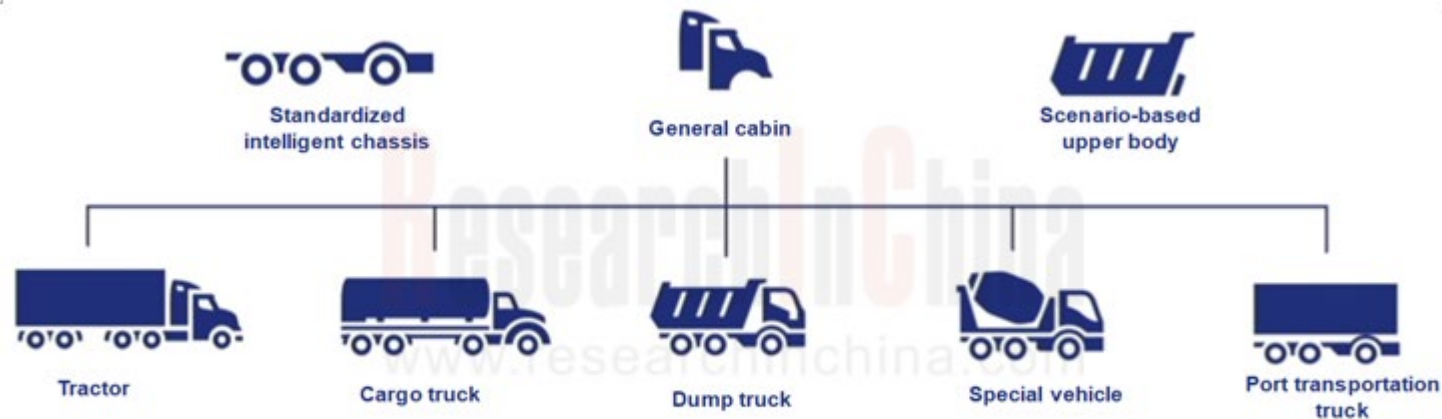
# Both OEMs and suppliers now have made layout of standardized intelligent chassis

Chassis standardization also facilitates technical development of chassis sub-components. The first is X-by-wire technology. Electronic control replaces mechanical control, completing the process of chassis intelligence 1.0. Once steer-by-wire and brake-by-wire technologies are mature, corner modules may be developed by referring to passenger car chassis to put steering and braking close to wheels. Schaeffler is developing related products. The second is structured battery pack, with battery cells directly integrated into vehicle frame/body to reduce weight and simplify structure. Currently all-electric heavy and light trucks already implement CTP (Cell to PACK) technology, while CTC (Cell to Chassis) technology develops with skateboard chassis as the carrier.

Both OEMs and suppliers now have made layout of standardized intelligent chassis:

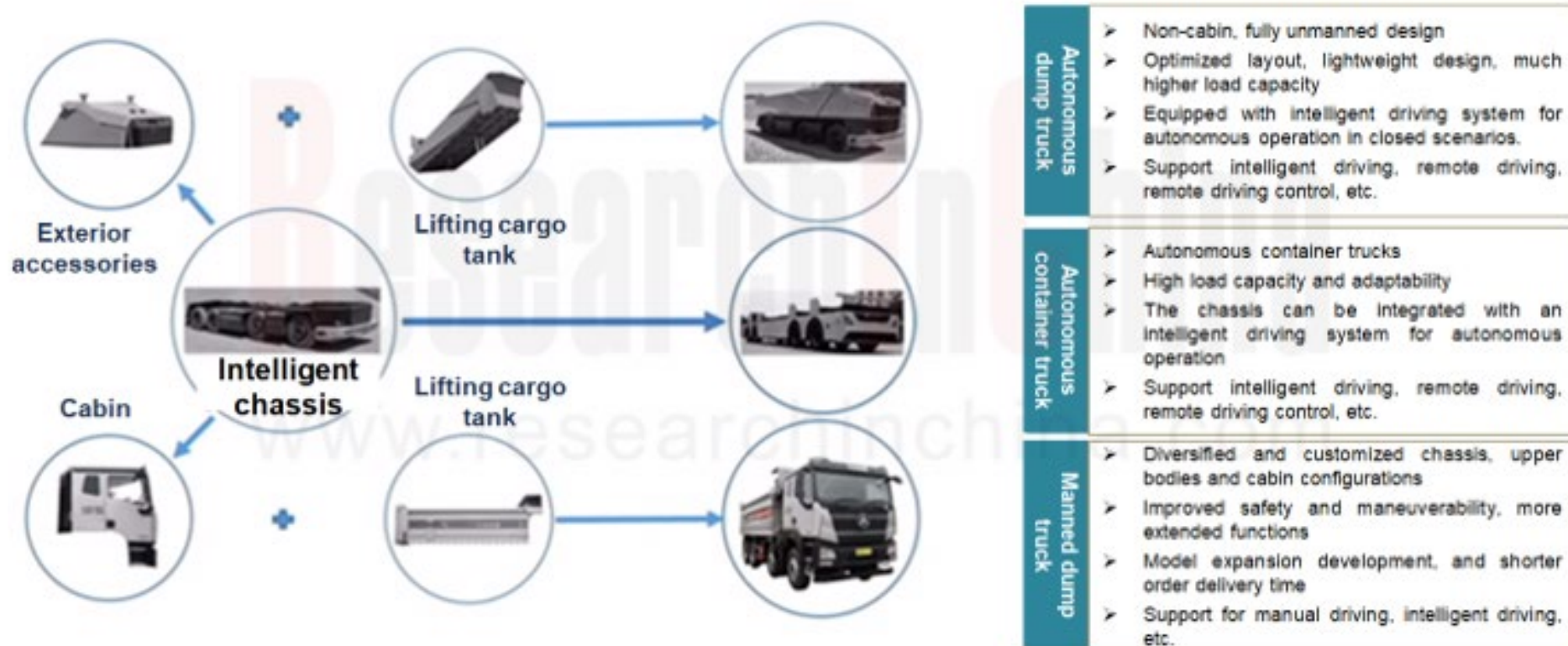
Representative products of OEMs: King Long's AICO chassis-by-wire, SANY Heavy Industry's intelligent chassis, Qingling Motors' all-electric light truck skateboard chassis, Beiben Trucks' all-electric non-cabin intelligent chassis, etc.

Representative products of suppliers: Kunlang Technology's autonomous commercial vehicles, PIX's skateboard chassis EMC platform, REE's P7 series chassis, all-electric chassis of Ifyou Technology (a wholly-owned subsidiary of GWM) for new Changzheng No.1 special vehicles, etc.



Source: FAW Jiefang

## Expandable Vehicles with SANY Heavy Industry's Intelligent Chassis



Source: SANY Heavy Industry



## 4. Battery-chassis integration reshapes supply relationships

In the wave of commercial vehicle electrification, batteries have become another critical component on chassis. At present all-electric commercial vehicles have been promoting CTP and CTC technology, and power battery core technologies are held by major battery manufacturers which have a bigger say in promoting battery-chassis integration.

In CATL's case, it set up CATL (Shanghai) Intelligent Technology Co., Ltd., its wholly-owned subsidiary specializing in design, production, sales and service of CIIC (CATL Integrated Intelligent Chassis), and has laid out an integrated intelligent chassis production base construction project in Yichun in January 2023.

Conventional battery manufacturers are transforming into integrated suppliers of batteries and chassis. According to relevant research, in the future more than 70% of profits from new energy commercial vehicles will be taken by battery companies. Battery companies are extending downward to the chassis. Commercial vehicle OEMs need to further consider how to have the initiative in development of new energy technologies in the future.

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