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Commercial Vehicle Intelligent Chassis Industry Report, 2024

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Commercial vehicle intelligent chassis research: 20+ OEMs deploy chassis-by-wire, and electromechanical brake (EMB) policies are expected to be implemented in 2025-2026

The Commercial Vehicle Intelligent Chassis Industry Report, 2024 released by ResearchInChina combs through and summarizes status quo, installation, product layout of suppliers, and predicts future development trends of commercial vehicle intelligent chassis.

1. Foreign EMB laws and regulations are expected to be introduced in 2025, and China is expected to implement in 2026.

Foreign EMB laws and regulations: Since 2018, the Economic Commission for Europe (ECE) has begun to discuss the inclusion of EMB into the topics of the UN R13 Conference. In the first half of 2024, the ECE completed the draft version of revised EMB standards, which is submitted for review in 2024 and will be officially released in 2025.

China's EMB laws and regulations: China started revising EMB regulations one year later than foreign countries. In 2019, the National Technical Committee of Auto Standardization (NTCAS) included the formulation of EMB standards in the "14th Five-Year Plan" for braking industry standards. In September 2024, the Ministry of Industry and Information Technology (MIIT) issued the second exposure draft of "GB21670: Technical Requirements and Testing Methods for Passenger Car Braking Systems", adding EMB-related technical requirements for the first time, which marks a significant progress in China's EMB regulations. The new version of GB 21670 is expected to be published in July 2026, and EMB-related technical requirements of new GB21670 are also consistent with European standards. GB12676 (commercial vehicles) is being revised.

Comparison of Formulation Process between Chinese and Foreign EMB Regulations

Time	Foreign EMB regulations	China's EMB Regulations
2018	November: the ECE started discussing the inclusion of EMB in the topics of the UN R13 Conference in Heidelberg, at which a representative from Swedish company Haldex (the head of design at Haldex at the time) made a speech.	-
2019	<ul style="list-style-type: none"> Q2: Propose amendments to CLEPA and OICA (European Association of Automotive Suppliers and International Organization of Motor Vehicle Manufacturers). Q3: Submit proposals to the Working Party on Automated/Autonomous and Connected Vehicles (GRVA) and meetings. 	NTCAS included the formulation of EMB standards in the "14th Five-Year Plan" for braking industry standards, and planned to revise GB/T "Performance Requirements and Test Methods for Road Vehicle Electromechanical Brake System (EMB)" in conjunction with UN R13 and UN R13-H.
2020~2022	EMB-related legislation work continued according to the process.	<ul style="list-style-type: none"> November 2020: Started the filing of industry association standard "Performance Requirements and Bench Test Methods for Commercial Vehicle Electromechanical Brake Caliper Assembly". September 2022: Officially promulgated and implemented "Performance Requirements and Bench Test Methods for Commercial Vehicle Electromechanical Brake Caliper Assembly", led by Zhejiang Vie Science & Technology Co., Ltd., Hengchuang Zhixing, etc.
2023	The revised version of European ECE R13/R13H standard on EMB began to be written.	-
2024	The draft version of the revised EMB standard was completed in the first half, and is about to be submitted for review in 2024 and officially released in 2025.	<ul style="list-style-type: none"> September 2024: MIIT issued the second exposure draft of "GB21670 Technical Requirements and Testing Methods for Passenger Car Braking Systems", adding EMB-related technical requirements for the first time. According to the latest news, the new version of GB 21670 is expected to be released in July 2026. The technical requirements for EMB in GB21670 are also consistent with the European standard. GB12676 (commercial vehicles) is being revised.

Source: ResearchInChina

20+ commercial vehicle OEMs deploy chassis-by-wire, accelerating commercial vehicle chassis intelligence

2. 20+ commercial vehicle OEMs deploy chassis-by-wire, accelerating commercial vehicle chassis intelligence.

According to incomplete statistics, more than 20 commercial vehicle OEMs have deployed chassis-by-wire by way of self-development or technical cooperation. For example, JMC depends on Tongling Technology to develop intelligent chassis, a company which established in April 2022 and was incubated by JMC and Tongji University. It concentrates on R&D of commercial vehicle intelligent chassis products and provides intelligent chassis solutions for intelligent driving companies.

Intelligent Chassis Technology Layout of Some Commercial Vehicle OEMs

S/N	Commercial Vehicle OEM	Intelligent Chassis Solution	Application Cases	Technical Cooperation
1	Yutong	2nd Generation Electric Chassis (EHB + EPB)	New energy light truck T2	-
2	Shaanxi Automobile	S-Pilot Platform integrating a chassis-by-wire system	X6000 Highway Logistics Driving Assistance Solution, H6000 Port Intelligent Transport Solution, M3000S Mining Area Intelligent Transfer Solution, L6000 Sanitation Autonomous Cleaning and Sweeping Operation Solution	-
3	Dongfeng Commercial Vehicle	Chassis-by-wire, 2nd-generation intelligent chassis (EMB , four-wheel corner module)	New energy urban sanitation vehicle with chassis-by-wire; 2nd-generation intelligent chassis: intelligent crossover vehicle	-
4	Beiben Trucks	All-electric cabin-free intelligent chassis	Fuel-powered/all-electric intelligent container truck	-
5	JMC	Chassis-by-wire	Intelligent light truck chassis products, all-electric light truck JMC Lexing E Luda, all-electric commercial vehicle E Fushun/E Shunda	Tongling Technology
6	WESTWELL	Chassis-by-wire (EBS/EPB+ESC+ EHPS)	Q-Tractor new energy autonomous tractor, Q-Truck intelligent battery-swapping autonomous heavy truck, E-Truck intelligent connected new energy heavy truck	Self-developed
7	Windrose	2nd-generation chassis-by-wire (first EPS + EMB, supporting L5 autonomous driving)	-	Self-developed
8	SAIC Yuejin	Smart city logistics vehicle chassis-by-wire (C-EPS&EHPS, EBS, EPB)	SAIC Yuejin EC500i	-

Source: ResearchInChina

Commercial vehicle steering: As the demand for intelligent driving of commercial vehicles expands, electro-hydraulic coupling power steering system comes into being

In the past few decades, commercial vehicles have widely adopted hydraulic power steering systems (HPS). For the oil pump of HPS is driven by the engine, with the increasing proportion of new energy commercial vehicles in sales, electrohydraulic power steering systems (EHPS) that use electric pumps to replace engines have also increased accordingly. Yet as commercial vehicles have increasing demand for intelligent driving steering functions, EHPS is unable to actively intervene in steering control and cannot meet the demand. At present, a great deal of researches have been conducted at home and abroad on commercial vehicle electric steering systems that can implement active steering intervention control, including electro-hydraulic coupling power steering (EHPCS) systems.

EHPCS essentially integrates an EPS motor system at the steering input end of the HPS system, including the sensor unit, motor, control unit and worm gear reducer. It is a new steering system with both electric and hydraulic power. In terms of intelligence, EHPCS provides a higher degree of freedom through the design of motor control algorithms to improve driver's steering feel on roads, and enables intelligent steering functions by controlling motor active intervention, for example:

Since Bosch completed the acquisition of ZF Steering Systems in 2015, and Servotwin was included in Bosch's commercial vehicle steering product line. Its electro-hydraulic hybrid power steering system - Servotwin Gen3 - can achieve such functions as active return and speed-dependent power steering. In April 2024, Bosch introduced Servotwin Gen4, the fourth-generation electro-hydraulic hybrid power steering system;

Yutong Bus cooperated with Zhengzhou University of Light Industry and Zhejiang University of Technology on the "R&D and Application of Key Technologies of High-performance Electro-hydraulic Coupling Steering System for Buses" in 2023;

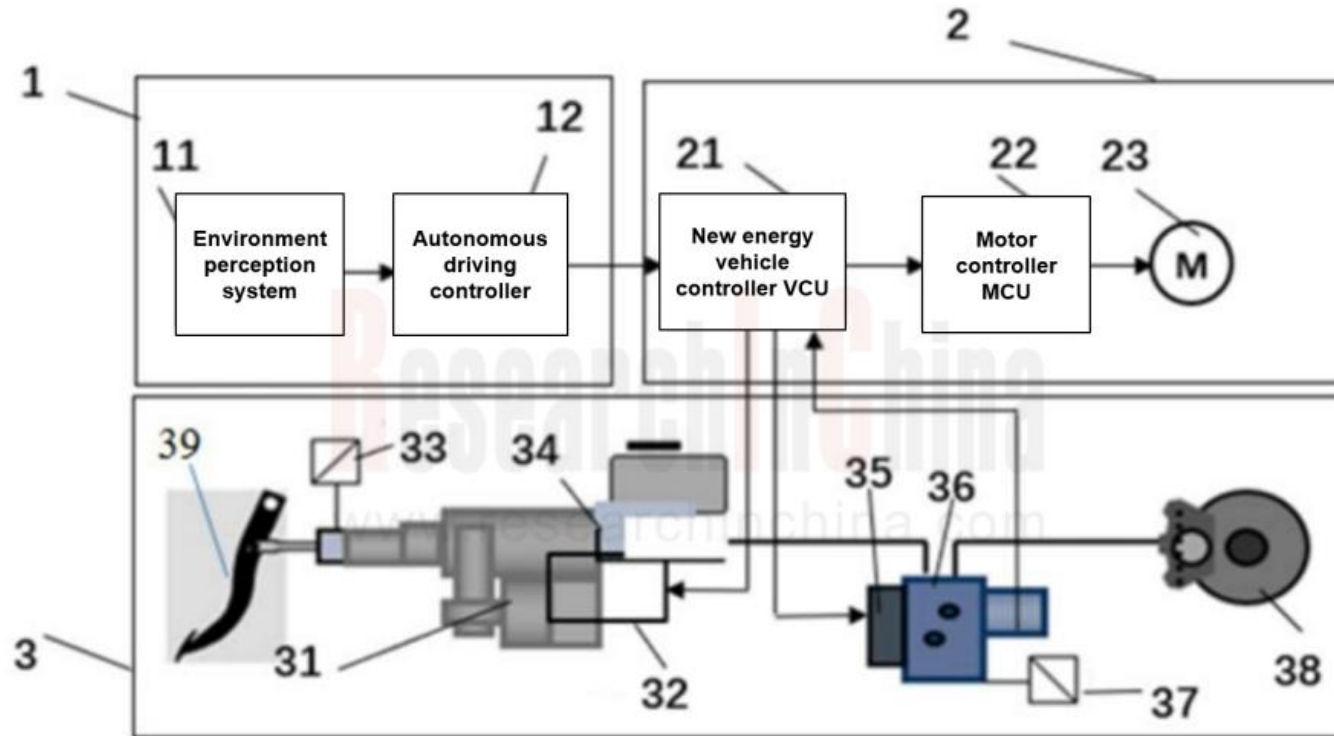
In 2023, Shi Guobiao and others from Beijing Institute of Technology studied a new method for emergency steering using a new type of Integrated Electro-Hydraulic Steering System (IEHS);

In August 2024, Xiamen King Long United Automotive Industry Co., Ltd. released "A Collaborative Control Method for A Vehicle Electro-hydraulic Coupling Redundant Steer-by-wire System", with patent number CN118466158A;

In October 2024, Zhengzhou University of Light Industry announced its patent for "An Electro-Hydraulic Coupling Braking System and Integrated Control Method for Autonomous Commercial Vehicles", with patent number CN118722557A.

Zhengzhou University of Light Industry's Patent CN118722557A: Structure Diagram of Electro-Hydraulic Coupling Control System

Zhengzhou University of Light Industry's Patent CN118722557A: Structure Diagram of Electro-Hydraulic Coupling Control System



PS: 1 - autonomous driving system; 2 - electric drive system; 3 - electrohydraulic braking system

Source: Google Patents

Bosch: Servotwin Electro-Hydraulic Hybrid Power Steering System

Bosch: Servotwin Electro-Hydraulic Hybrid Power Steering System

In April 2023, at the Auto Shanghai, Bosch unveiled its third-generation electro-hydraulic hybrid power steering system, Servotwin Gen3, and its fourth-generation fully redundant electro-hydraulic hybrid power steering system, Servotwin Gen4.2. In April 2024, at the Auto China, Bosch showcased its fourth-generation electro-hydraulic hybrid power steering system, Servotwin Gen4, which will come into mass production in the second half of 2024.

Servotwin Gen4 has following functions:

- Supports higher-level L4 or L5 autonomous driving at all speeds and all times, and in all scenarios; Some additional comfort functions such as active self-centering and speed-dependent power steering; Multiple compensation functions, for example, when the vehicle encounters side winds and may bump, some torque can be applied to keep the vehicle balanced to achieve "side wind compensation";
- Supports encrypted communication, CAN-FD variable rate communication, high-speed communication, and online flashing;
- Adopts AUTOSAR open system architecture.

Servotwin Gen4 - Electro-hydraulic Hybrid Steering System



Source: Bosch

Brake suppliers: multiple Chinese and foreign suppliers have completed the EBS product layout, promoting large-scale application of EBS

At present, WABCO, KNORR, Ruili Kormee, and Trucknow Technology have mass-produced EBS systems; Wanxiang Qianchao's EBS system has been designated and mass-produced; EBS systems of Bosch and Tsintel Technology are expected to be spawned by the end of 2024. Many Chinese and foreign suppliers have completed the EBS product layout, promoting the large-scale application of EBS.

In April 2024, Bosch's Electronic Braking System (EBS) debuted at the Auto China. It controls braking via electronic signals, achieving safer and more efficient braking with more intelligent and precise control, and can better cooperate with electronic auxiliary functions such as anti-lock braking system (ABS) on the vehicle. The system, developed by Bosch's local core team in cross-domain cooperation, is being tested by China's first-tier OEMs, and is scheduled to be produced in quantities by the end of 2024.

Bosch's Electronic Braking System (EBS)



Source: Bosch

Trucknow Technology's EBS System

Trucknow Technology focuses on the research of "full-stack independent controllable chassis-by-wire intelligent driving solutions" for commercial vehicles. It has currently mass-produced EBS systems, trailer TEBS, and AEB systems. Its EBS system has advantages of quick braking response, short pressure build-up time, reasonable braking force distribution, and consistent braking of main body and trailer. In March 2024, the EBS system, self-developed, calibrated and tested by Trucknow Technology, met the customer's requirements and standards in all test items, and was successfully accepted.

Trucknow Technology's EBS System



Source: Trucknow Technology

Trucknow Technology's trailer TEBS is a braking control system evolved from the ABS system. It adds additional auxiliary functions for intelligent trailers, significantly improving the braking stability and safety of semi-trailers.

Trucknow Technology's TEBS System



TEBS valve



PEM module



TEBS expansion module



Shaft lift valve



ECAS solenoid valve

Source: Trucknow Technology

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