
Off-Highway Research

The Construction Equipment Industry in CHINA

Company Profile

VOLVO CONSTRUCTION EQUIPMENT

November 2018



A Subscription Service



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INTRODUCTION

This is Off-Highway Research's first profile of **Volvo Construction Equipment (Volvo CE)** in the Chinese service. In the last 20 years, the company has evolved from a niche market supplier, concentrating on its wheeled loader and articulated dump truck product lines largely within the confines of the European market, into a company that offers a full line of equipment with a truly global presence.

This report focuses on its operations in the construction industry in China, where it was one of the earliest international participants and has been ranked among the industry's major suppliers for many years.

SUMMARY

Table 1. Volvo CE (China): Statistical Summary, 2014-2017

	Turnover (RMB Mn)	Net Profit (RMB Mn)	Production (Units)	
			Crawler Excavators	Mini Excavators
2014	1,855.4	43.5	2,500	850
2015	481.2	7.0	750	400
2016	453.8	12.6	1,150	300
2017	1,308.9	48.9	3,500	800

Source: Off-Highway Research

HISTORICAL DEVELOPMENT

Volvo Construction Equipment can trace its history back to 1832, when **Eskilstuna Mekaniska Verkstad (EMV)**, the Eskilstuna Engineering Works, began business in Sweden. In 1906 it introduced the company's first construction machine, a steam-powered roller, while in 1913 it produced Sweden's first agricultural tractor. By 1924 it had begun the production of motor graders.

In 1932, EMV which by then had changed its name to Munktells Mekaniska Verkstad, merged with Bolinders Mekaniska Versktad of Stockholm to form **AB Bolinder-Munktell** and in 1950 it was bought by the Volvo Group, then a nascent car manufacturer. In 1954 it began to make the product for which it became famous, the wheeled loader. Production of articulated dump trucks started in 1966.

In 1985 the merger of the construction equipment interests of Volvo and Clark Michigan of the US led to the formation of **VME**. The American part came mainly from the Michigan wheeled loader enterprise, although it also included the Euclid rigid dump truck business.

1993 saw the signing of an agreement of a joint venture in the rigid dump truck business with Hitachi Construction Machinery Co. The Euclid rigid dump truck business became **Euclid-Hitachi Heavy Equipment Inc (EHHE)**, in which Volvo had a 40 per cent share. By 2001, Volvo sold its entire interest to Hitachi and withdrew completely from the rigid dump truck sector.

In 1995, VME became wholly owned by the Volvo Group, and changed its name to Volvo Construction Equipment. At the same time, it purchased Groupe **Pel-Job** of France, a maker of mini excavators and site dumpers. In 1997, Volvo CE acquired one of the world's leading manufacturers of motor graders, **Champion Road Machinery**, based in Ontario, Canada. In 1998 it purchased the construction equipment interests of **Samsung Heavy Industries (SHI)**, which gave it hydraulic excavator production facilities in the Far East for the first time.

In 2007, Volvo CE acquired a 70 per cent of share in **Shandong Lingong Construction Machinery Co. Ltd**, commonly referred to as **SDLG**. In the same year, it bought a number of assets in the road machinery business from **Ingersoll-Rand (IR)** of the USA, through which it added heavy compaction equipment, pavers and milling machines to its range, and acquired plants in the USA, Germany and India.

In the recent past, the company has expanded its global manufacturing footprint, mainly for excavators, in Russia, India and Brazil (for SDLG). Meanwhile, the company ceased production at the Asheville plant in the USA in 2010, moving its wheeled loaders to Sweden and excavators to South Korea. It also completed the move of the motor grader production from Ontario to the expanded Shippensburg

plant, the recent beneficiary of a US\$30 million investment in the establishment of a road machinery manufacturing facility.

Table 2. Volvo CE: Historical Highlights, 1832-2018

	Highlights
1832	Johan Theofron Munktell and the brothers Jean and Carl Gerhard Bolinder started an engineering workshop in Eskilstuna, Sweden.
1853	Production of Sweden's first railway locomotive.
1906	Munktell builds the first steam powered road roller.
1913	Munktell produces Sweden's first agricultural tractor.
1924	Launch of the first motor grader.
1932	Munktell merged with Bolinder of Stockholm to form AB Bolinder-Munktell.
1950	AB Bolinder-Munktell bought by Volvo Group.
1954	Launch of the first wheeled loader.
1966	Launch of the world's first articulated dump truck.
1985	Merger of the construction equipment interests of Volvo and Clark Michigan of the US leads to form VME.
1993	Signing of an agreement to form a joint venture for rigid dump trucks with Hitachi Construction Machinery Co.
1995	VME becomes wholly owned by the Volvo Group and renamed Volvo Construction Equipment. Acquisition of Groupe Pel-Job.
1997	Acquisition of Champion Road Machinery.
1998	Acquisition of the construction equipment interests of Samsung Heavy Industries. Beijing representative office of Volvo Construction Equipment founded.
2002	Founding of Volvo Construction Equipment (China) Co. Ltd with headquarters in Shanghai.
2007	Acquisition of 70 per cent of Shandong Lingong Construction Machinery Co. Ltd. Acquisition of Ingersoll-Rand's road construction machinery division.
2009	A technical training, support and service centre opened in Shanghai
2010	Founding of Volvo Construction Equipment Technology (China) Co. Ltd. Launch of Competence Development Centres
2011	Founding of Volvo Construction Machinery (Shandong).
2012	China evolves as one of the four major markets of Volvo CE worldwide.
2013	Founding of Volvo Construction Equipment Investment (China) Co. Ltd (VCEIC). Acquisition of Terex's dump truck business. Becomes a shareholder in Inner Mongolia North Hauler Joint Stock Co. Ltd (NHL). Opening of Jinan Technology Centre.
2014	Decision to cease producing motor graders and backhoe loaders under the Volvo brand and to transfer them to the SDLG brand. Volvo Construction Machinery (Shandong) renamed Volvo Construction Equipment Machinery (China).
2017	Celebration of the 15th anniversary of Volvo CE (China). Volvo Remanufacture Centre receives official certification.
2018	Cumulative production in Shanghai factory reaches 30,000 units. Announcement made on divestment from NHL.

Source: Off-Highway Research

In June 2014 Volvo CE finalised the acquisition of Terex's dump truck business, indicating the company's return to the rigid dump truck market for the first time since 2001. This resulted in the acquisition Terex Equipment's facility in Scotland and its distribution network in the USA. Volvo also became the ultimate owner of Terex's shares in its joint venture with **Inner Mongolia North Hauler Joint Stock Co. Ltd (NHL)** in Baotou, China. Controlled by the Volvo Group, Terex Equipment

still exists as a direct shareholder, owning 25.16 per cent of the in NHL. On 26 March 2018, Volvo sold its shares in NHL and sold them to a Chinese investment company, but it continues supplying components to NHL.

Other recent important changes include the decision to cease producing motor graders and backhoe loaders under the Volvo brand and to transfer them to SDLG. Accordingly, production of both machines has been moved to Linyi in China, while the company's backhoe facility in Poland has been closed.

Volvo CE has been selling construction equipment in China since the late 1970s. The Beijing representative office, co-ordinated from Volvo CE East Asia in Singapore, was established in 1998, and then moved to Shanghai in September 2000. In March 2002, **Volvo Construction Equipment (China) Co. Ltd** was founded in Shanghai.

In March 2003 Volvo CE opened its first construction equipment manufacturing operation in China. Located in Pudong Shanghai, the factory initially focused on excavators and production started with crawler products with the first machine, an EC210B model, being produced in April that year. The first mini excavator was produced in 2004. In 2009, the headquarters of Volvo Construction Equipment (China) was moved to these premises from downtown Shanghai following the completion of its technical and customer support centre.

On 27 September 2006, Volvo announced its agreement to acquire a 70 per cent share of SDLG, at the time the fourth largest wheeled loader manufacturer in China. This deal, valued at RMB327.5 million, was finalised in early 2007. In 2008, Volvo CE started selling SDLG-branded wheeled loaders into selected overseas markets, most of which were developing countries.

Volvo announced the acquisition of the road machinery business of IR in March 2007. Following the closure of IR's Wuxi factory, production of compaction equipment and asphalt finishers was relocated to a rented facility in SDLG's factory in Linyi. IR and **Shaanxi Construction Machinery Co. (SCMC)** had reached an agreement to produce under licence a range of asphalt finishers early in 1992, which has been renewed every five years ever since. Volvo updated the agreement with SCMC in mid-2008.

Since 2010, Volvo CE has been building its Competence Development Centres jointly with its local dealers. By 2012, China had evolved into being one of Volvo's four major worldwide markets, underlining its significance to the company. Meanwhile Volvo CE signed a memorandum with the Municipal Government of Shanghai to consolidate its regional headquarters in Shanghai through the investment of US\$350 million on sales, logistics, R&D, purchasing and financial services.

In 2013, **Volvo Construction Equipment Investment (China) Co. Ltd (VCEIC)** was founded in Shanghai and was recognised by the government as the regional headquarters of a multinational company. Later, a total of RMB150 million was added to the registered capital. When VCEIC became fully operational in 2014, its registered capital had reached RMB370 million. In the same year, Volvo Construction Machinery (Shandong), founded in 2011, was renamed **Volvo Construction Equipment Machinery (China) Co. Ltd** to assume control of Volvo CE's operation in Linyi.

In 2010, Volvo decided to build an R&D facility in China and for this it registered **Volvo Construction Equipment Technology (China) Co. Ltd**. Four years later, **Jinan Technology Centre** was officially opened to focus on product design, development and testing.

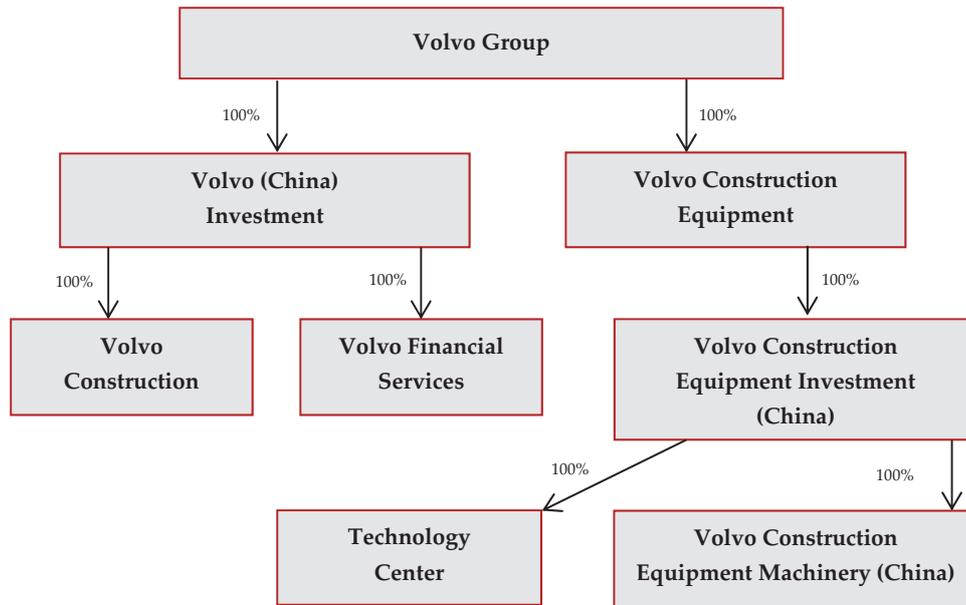
The Volvo Group was certified as the remanufacturing pilot enterprise by the National Development and Reform Commission (NDRC) in February 2013. Two years later, a second-hand equipment business was set up within Volvo CE. In April 2017, the Volvo Remanufacture Centre was officially checked and accepted by NDRC, which means it can apply for financial and policy support from the government and its products can bear the remanufacture mark issued by NDRC and State Administration for Market Regulation, previously called the State Administration for Industry and Commerce. The Centre currently focuses on the remanufacture of engines and parts.

On 26 April 2018, Volvo CE (China) celebrated the completion of its 30,000th machine produced in its Shanghai factory.

COMPANY STRUCTURE

Volvo CE is one of the 10 business areas in the Volvo Group, with the others being Volvo Trucks, UD Trucks, Renault Trucks, Mack Trucks, Group Trucks Asia & JVs, Volvo Buses, Volvo Penta, Governmental Sales and Volvo Financial Services (VFS).

Chart 1. Volvo CE: Structure of Ownership, 2018



Source: Off-Highway Research

From an initial representative office, Volvo has developed a full range of functions in its construction equipment operations in China. While Volvo CE (China) and Volvo Construction Machinery (China) control production of Volvo-branded products in Shanghai and Linyi (except those sourced from SDLG), VCEIC is responsible for sales, marketing, services and parts.

Table 3. Volvo CE in China: Company Structure, 2018

Company Name	Registered Capital	Responsibility
Volvo Construction Equipment Investment (China) (VCEIC)	RMB1,372 Mn	All functions except production
Volvo Construction Equipment (China)	USD41.3 Mn	Production in Shanghai
Volvo Construction Equipment Machinery (China)	RMB77 Mn	Production in Linyi
Volvo Construction Equipment Technology (China)/Jinan Technology Centre	RMB256 Mn	Product development and testing

Source: Off-Highway Research

Off-Highway Research

As the company's regional headquarters, Volvo CE's Shanghai office is also responsible for production purchasing in China and overseas, while the Jinan Technology Centre oversees R&D, with both operations reporting directly to their respective organisations in the Swedish headquarters. Volvo Financial Services and the remanufacturing operations serve Volvo CE as well as other business units within the group.

FINANCIAL DATA

After total net sales grew year-on-year by 11 per cent to SEK 335 billion in 2017, the Volvo Group achieved its highest sales and operating income in history. Construction Equipment, Trucks, Volvo Penta and Financial Services all posted record operating income.

Table 4. Volvo Construction Equipment (China): Turnover, 2014-2017

	Turnover (RMB Mn)	Net Profit (RMB Mn)	Net Profit Margin (%)
2014	1,855.4	43.5	2.3
2015	481.2	7.0	1.5
2016	453.8	12.6	2.8
2017	1,308.9	48.9	3.7

Source: Off-Highway Research

Over the last few years, Volvo CE has been focusing on profitability rather than on continuing to increase volumes or the product range, and one of its aspirations is to have industry leading levels of profitability. While net sales increased from SEK 51 billion in 2016 to SEK 66 billion last year, adjusted operating margins reached 11.9 per cent, up from 4.4 per cent over the same period the year before. A total of 64,127 machines were delivered worldwide in 2017, up by 45 per cent over 2016, with Asia being the main destination for machines accounting for 57 per cent of the total.

Volvo Construction Equipment (China) Co. Ltd substantially improved its sales to RMB1.3 billion, up by 188 per cent, while its net profit of RMB48.9 million exceeded that in 2014 when its turnover was RMB1.9 billion. As a result, its margin increased from 1.5 per cent in 2015 to 3.7 per cent in 2017, indicating solid progress towards the corporate goal of improving profitability.

MANUFACTURING FACILITIES

Table 5. Volvo CE: Manufacturing Facilities, 2018

	Shanghai	Linyi
Land Area (m²)	128,000	-
Covered Area (m²)	26,500	24,000
No. of Employees	250	160
Product Range	Crawler excavators	Asphalt finishers, compaction equipment, crawler excavators, mini excavators, wheeled loaders; transmissions

Source: Off-Highway Research

Volvo has manufacturing facilities worldwide, while in China it produces a broad range of products in two facilities; its own factory in Shanghai and a rented facility in SDLG’s plant in Linyi.

In March 2003 Volvo opened its first construction equipment manufacturing operation in China. Located in the Shanghai Jinqiao Export Processing Zone, Pudong, the factory had a total area of 68,000 m². It was originally designed to produce 22 and 30 tonne crawler excavators with an annual capacity of 1,500 units, or five units per day. In 2004, the line for compact products was completed and production of the 5.5 tonne EC55B mini excavator model started. That year also saw the localisation of the first key welding parts and the completion of the company’s 1,000th excavator.

After a new plant for structural parts was completed in 2006, capacity reached seven units a day, after which Volvo increased capacity to 27 units per day in 2011 when total output reached 7,500 units.

The factory now occupies a 13 hectare site after an additional land area of 60,000 m² was added, with the covered area now being about 26,500 m². With a workforce of some 250 people, this plant is one of the most efficient factories in China and one of Volvo CE’s largest worldwide. The current output is 25 units on a single shift.

The factory has been continually improving its in-house manufacturing capability and reducing its reliance on key imported parts. It has now established a full range of operations for steel cutting, welding, machining, painting, assembling and testing. In addition, it has been rigorously pursuing safety, quality control and environmental requirements, which have allowed it to be certified for ISO 9001, ISO14001 and OHSAS 18001, as well as being awarded numerous national, local and industrial awards.

The Linyi plant in Shandong lies on a massive site designated as the SDLG Industrial Park and now extends to cover 200 hectares, of which some 150,000 m² is covered.

This includes three factories, and Volvo has rented two facilities in the North Factory.

The first products manufactured in Linyi were compaction equipment in 2008 following the closure of IR's Wuxi factory, with asphalt finishers being added shortly afterwards. Production of mini excavators was relocated to Linyi from Shanghai in 2009 to take advantage SDLG's substantial production capacity. Then one crawler excavator model, the EC80, was added in 2013 while the EC75 is sourced from SDLG in an OEM arrangement agreed this year.

While production of the L105 wheeled loader, targeted at the domestic market, has been stopped, Volvo CE now produces three wheeled loader models there, the L60Gz, the L90Gz and the L120Gz. In addition, it also manufactures its HT series of transmissions in Linyi.

CORPORATE STRATEGY

As the oldest construction equipment company in the world still active in the industry, Volvo defines itself as a leading total solution provider and is strongly committed to sustainable development, as expressed by the company's pledge to "build a world we want to live in".

With core values being quality, safety and environmental care, Volvo CE manufactures premium construction equipment featuring good fuel efficiency and high uptime that offers many product features and services. It has also become a pioneer in innovation in the belief that its future products and services will play an important part in building a sustainable society.

One thing that sets it apart from many other manufacturers in the industry is that the construction equipment business is part of the Volvo Group, one of the leading manufacturers of trucks, buses and engines. This offers many benefits such as the knowledge and experience in electromobility in the automobile industry. The Group has made over 15 years of investment into creating a common architecture and shared technology system (CAST) covering engines, electronics, transmissions, chassis, connectivity, electrification, and automation, which is shared by its member companies. Last year, the group spent 4.5 per cent of its net sales on R&D.

Volvo is strongly represented worldwide with products distributed in more than 190 countries. Along with the changing market landscape, dynamics and growth potential, the company restructured its sales organisation in 2012 into four regions. For the first time, **China** has evolved from just one country market in the **Asia-Pacific** region to one of the four key regions defined by the company, with the other two being **Americas** and **Europe/Middle East/Africa (EMEA)**.

Worldwide, Volvo CE has adopted a strategy of acquisition to quickly become a major supplier of a wide range of products. In China, it now offers over 40 different models covering dump trucks, hydraulic excavators, mini excavators, asphalt finishers, compaction equipment and wheeled loaders.

All purchased brands had been integrated into the Volvo corporate identity until the acquisition of SDLG. The company also retains the Terex brand for the purchased truck business with the agreement allowing its continued use until 2019, at which point a long term approach will have been decided. Today, all three brands co-exist.

In particular, the dual-brand strategy that was put in place following the acquisition of SDLG might well have established an unprecedented and successful example in one of the most dynamic and complicated markets. On the one hand, Volvo CE has provided unreserved support, generous investment and vital technological contribution to SDLG, which have enabled it to expand its market share and product

portfolio, as well as improving its profit margin. On the other hand, Volvo CE makes use of SDLG's facilities to localise the manufacture of its own range of products, and this has enabled it to efficiently expand its local product portfolio without investing further into production facilities. This has greatly relieved any financial pressures during the recent 5-year downturn when many international and indigenous manufacturers had to close factories and product lines in order to reduce costs.

The combined performance of Volvo CE in the premium market, and SDLG in the value market has made the Group the world's largest supplier of wheeled loaders in 2017, and the fourth largest supplier of crawler excavators market that year.

Volvo CE believes it is critical to have a strong design and manufacturing presence where the machines are used. This would give it a greater understanding of customers and their needs, which would enable it to provide tailored products and solutions and deliver them to customer within a shorter lead time. This explains its different investments in China, especially its Technology Centre which demonstrates its strategic commitment to serve Chinese customers.

Its marketing strategy has been aligned with the core values of the company. Volvo CE has been actively participating in various sustainability initiatives such as World Wide Fund (WWF), Climate Saver and Construction Climate Challenge. The popular annual 'Operator Idol' programme held from 2011 to 2014 promoted fuel-efficient operating skills and conveyed the message of environmental care. A total of over 400,000 operators have enrolled in the competition, with over 20,000 of them participating in over 100 competitions nationwide.

The company firmly believes that for a sustainability initiative to be meaningful, it must be environmentally and socially beneficial as well as economically viable. To take account of the complete life cycle of the product, it has introduced remanufacturing operations in the market.

Cultivating talent and educating future generations have always been important to Volvo CE. Since 2010, the company has been building Competence Development Centres across the country. This is a three-party cooperation uniting local colleges responsible for student recruitment, local dealers offering internships and jobs and Volvo providing teaching equipment, training material, qualifications and scholarships. Students can learn about Volvo's core values, corporate culture, products, as well as business skills, communications and marketing. The oriented education and training have benefited Volvo dealers in recruiting, and in a broader sense has helped provide a level of professionalism to the overall industry.

In future, Volvo CE will focus on developing intelligent products, help customers in China collect first-hand data through the connectivity of machines so as to provide reliable information for optimising management, controlling costs and reducing

energy consumption; and eventually to improve the efficiency of project implementation and management.

RESEARCH AND DEVELOPMENT

Volvo CE has been developing technologies on electromobility and connectivity of intelligent machines and total site solutions to increase machine performance, productivity, efficiency and safety.

Its proprietary Co-Pilot and the assist-functionalities (such as Load Assist, Dig Assist, Compact Assist, Haul Assist and Pave Assist) are designed for use on different products, which can help operators achieve higher quality outcomes in less time and with less effort. In May 2017, Volvo CE unveiled the EX2 fully electric prototype compact excavator. It delivers the same power and force as its conventional counterpart with enough battery power to operate for eight hours in tough ground conditions. But it generates zero emissions, 10 times higher efficiency, and 10 times less noise, which appeared to be an unobtainable goal when first raised by the company in 2015.

The company has attached great significance on its cultivating local capability of research and development. Early in 2010, the decision was made to invest in a technology centre to concentrate on developing products and components targeted at customers in China, as well as other developing markets such as Brazil, India and Russia.

In 2014, a major facility was completed in Jinan, the capital city of Shandong. With a total investment of SEK270 million, the centre occupies a total area of 50,000 m², accommodating design offices, workshops, two test buildings and a test track. Both finished machines and components can be tested here. The great majority of the workforce of over 100 people is Chinese engineers.

As one of the largest markets worldwide, China features diversified customer requirements and constantly changing demand structure. The local R&D capability has enabled Volvo to better respond to local demand, and more importantly open new opportunities by stimulating innovative designs and products for the local market. Furthermore, the centre has also facilitated and explored co-operation between the Volvo and SDLG brands, capitalised on the synergies between the two organisations, and has created a close relationship between two factories. The L120Gz wheeled loader and the EC75D hydraulic excavator now being produced in Linyi are both products that have been the result of the centre's expertise.

COMPONENT SOURCING

Table 6. Volvo CE: Component Sourcing for Major Products, 2018

	Crawler Excavators	Mini Excavators
Booms and Arms	Zhejiang Katsushiro, Shanghai Katsushiro	Shanghai Katsushiro
Buckets	Zhejiang Katsushiro	Shanghai Katsushiro
Cabs	Supplier in Korea	Korean supplier in China
Drive Motors	Nabtesco	Supplier in Korea
Engines	Volvo	Volvo
Hydraulic Cylinders	KYB	Volvo Korea
Hydraulic Pumps	Kawasaki	Kawasaki
Hydraulic Valves	Kawasaki, Toshiba	Kawasaki
Slewing Motors	Kawasaki	Kawasaki
Slewing Rings	Xuzhou Rothe Erde	Xuzhou Rothe Erde
Tracks	Shantui	Shantui
Undercarriages	Local, in-house	Local, in-house

Source: Off-Highway Research

From its initial operation of kit assemblies, Volvo CE has made solid progress in localising its products, with many parts being either made in-house or outsourced from the local factories of international specialist suppliers. However, Volvo engines are used in excavators of all types and sizes, while key hydraulic components are still imported in order to retain its core competitiveness and ensure product reliability.

However, for many of its excavators and road machinery models, customers have the option of specifying either locally produced or imported machines, depending on their individual needs.

EQUIPMENT ANALYSES

DUMP TRUCKS

Volvo is a world leader in the design and manufacture of articulated dump trucks. In 2016 it celebrated its 50th anniversary of the introduction of its first machine, and last year saw the completion of its 75,000th in the same factory where the first machine – the DDR631 or ‘Gravel Charlie’ – was made, in Braås, Sweden.

Table 7. Volvo CE: Articulated Dump Trucks Available in China, 2018

Model	Payload (Tonnes)	Engine		Product Source
		HP	Manufacturer	
A25G	25.0	320	Volvo	Sweden
A30G	29.0	360	Volvo	Sweden
A45G	41.0	476	Volvo	Sweden

Source: Off-Highway Research

The company has had a long history in China of selling articulated dump trucks, which it imports from Sweden. There have been few successful domestic manufacturers of the product, and Volvo, the world’s leading manufacturer, has a distinct advantage over other importers. Over the years it has controlled almost 100 per cent of the Chinese market for articulated trucks, which nevertheless has always been very low volume and represents a specialist niche sector.

In the past, Volvo saw good sales to the railway sector and to a lesser degree to other construction applications. However, with the popular use of on-highway trucks and the growth in demand of on-off highway trucks, sales of articulated trucks have largely been limited to a small number of mining companies, mostly working in the nonferrous or non-metal mines in the southern provinces of the country. Although articulated trucks are significantly more expensive than the rigid models with equivalent payloads, those mining customers that can afford to buy Volvo’s articulated dump trucks benefit from their production efficiencies in soft underfoot conditions and on steep gradients.

Crucially, Volvo has been able to support its customers with technical advice when the mining process is designed and can satisfy end-users with its excellent after sales service, with the high quality of the trucks ensuring strong rates of loyalty among customers. Very recently the product range has been upgraded to the latest G version.

Table 8. Volvo CE: Sales of Articulated Dump Trucks in China, 2013-2017

	2013	2014	2015	2016	2017
Units	43	33	7	2	10

Source: Off-Highway Research

The company's sales of articulated trucks have depended heavily on demand from the mining industry, which has been weak for the last three years as a result of the slower economic growth as well as the new government regulations on mining operations. As a result, Volvo has suffered a decline in sales, although it has continued to hold a firm control over the domestic market in which it regularly enjoys a 100 per cent market share.

The business is expected to improve in the future with the anticipated future replacement demand, while overseas sales to its traditional Chinese customers working overseas have been developed, and these may well support sales when domestic demand is particularly tight.

In April 2018, Volvo unveiled its own range of Volvo-branded rigid dump truck at its Motherwell facility in Scotland, in a further step to enrich its product offering. This new range consists of four models, the 45 ton R45D, the 60 ton R60D, the 72 ton R70D and the 95 tonne R100E, development of which started after the acquisition of Terex Trucks. The largest model, the R100E, is stated to combine the market knowledge, customer inputs and technological resources of the Volvo Group. Built for surface mining and quarrying applications, these new machines will be introduced to China in the near future.

HYDRAULIC EXCAVATORS

Volvo started to sell in China crawler excavators imported from Korea shortly after it acquired the construction equipment division of Samsung Heavy Industry in 1998. This acquisition gave the company an established production facility in Asia and a wide range of excavators that could be offered to customers around the world including those in China. The first excavators to be produced in Korea with the design signature of Volvo were the B series that were launched in 2003. Production of this series simultaneously took place in the company's Shanghai factory. The first excavators to be produced in 2003 were the EC210B and EC290B models, which were followed by the EC55B and EC240B models in 2004.

Table 9. Volvo CE: Crawler Excavators Available in China, 2018

Type	Model	Engine		Service Weight (Tonnes)	Product Source
		HP	Manufacturer		
Crawler	EC75D	58	Volvo	7.4-7.8	Linyi
	EC80D Pro	58	Volvo	7.4	Linyi
	EC120D	98	Volvo	12.2-14.2	Shanghai
	EC140DL	104	Volvo	13.0-15.9	Shanghai, Korea
	EC170DL	122	Volvo	16.4-19.4	Shanghai, Korea
	EC200D	165	Volvo	20.1-20.8	Shanghai, Korea
	EC210D	165	Volvo	18.1-22.8	Shanghai, Korea
	EC220D/DL	165	Volvo	20.9-24.4	Shanghai, Korea
	EC250D/DL	185	Volvo	24.6-28.0	Shanghai, Korea
	EC300DL	228	Volvo	27.7-33.1	Shanghai, Korea
	EC350D/DL	282	Volvo	34.3-38.7	Shanghai, Korea
	EC380DL	288	Volvo	37.8-41.1	Shanghai, Korea
	EC480DL	355	Volvo	47.3-53.1	Shanghai, Korea
	EC700CL	464	Volvo	69.3-71.7	Korea
	EC750DL	516	Volvo	72.7-74.7	Korea
	EC950EL	603	Volvo	90.0-91.8	Korea
Wheeled	EW145B Prime	148	Volvo	12.8-15.0	Korea
	EW205D	174	Volvo	19.8-21.8	Korea

Source: Off-Highway Research

Since then, the product range has steadily evolved, with locally produced machines extending from 7 to 47 tonnes and now there are 16 crawler models in the D series, all of which are compliant with the latest Chinese emission regulations. Most of the production takes place in Shanghai except for the EC75D and EC80D models, which are manufactured in Linyi.

In 2017, the company more than tripled production to 3,500 units, representing the highest growth rate among all international brands, and its share of the total industry increased to 3 per cent. On 26 April 2018, the company celebrated the completion of its 30,000th machine produced in its Shanghai factory.

The wheeled excavator range, consisting of two models split across the B and D Series, are imported from Korea, as are the largest crawler model, the EC950E in its most recent E Series, the EC700CL and EC750DL, and some of its smaller machines.

Table 10. Volvo CE: Production of Crawler Excavators by Operating Weight Category, 2013-2017

Operating Weight (Tonnes)	2013	%	2014	%	2015	%	2016	%	2017	%
6.1-19.0	550	11	600	24	260	35	320	28	1,200	34
19.1-25.0	3,150	63	1,400	56	350	47	580	50	1,400	40
25.1-30.0	450	9	250	10	40	5	70	6	100	3
Over 30.0	850	17	250	10	100	13	180	16	800	23
Total	5,000	100	2,500	100	750	100	1,150	100	3,500	100

Source: Off-Highway Research

Volvo started out as a minor participant in the excavator market, and although it is better known for its wheeled loaders and articulated haulers, it has decades of excavator experience. Thanks to its strong brand recognition from its on-highway trucks and passenger cars, the company has been able to quickly establish itself in the market, and its excavators have won a solid reputation for themselves, especially with the fuel-saving features of its larger models. Its EC360B and EC460B were among the best-selling models in the 30.1-40.0 tonne class and in the 40.1-80 tonne class respectively. Their upgraded models, the EC380D and EC480D also won immediate market favour when they were launched in 2013.

Table 11. Volvo CE: Domestic Sales of Crawler Excavators by Operating Weight Category, 2013-2017

Operating Weight (Tonnes)	2013	%	2014	%	2015	%	2016	%	2017	%
6.1-19.0	870	16	602	19	310	24	445	32	1,130	31
19.1-25.0	2,640	48	1,515	47	600	47	555	40	1,320	36
25.1-30.0	410	7	260	8	80	6	50	4	50	1
Over 30.0	1,580	29	874	27	295	23	340	24	1,170	32
Total	5,500	100	3,251	100	1,285	100	1,390	100	3,670	100

Source: Off-Highway Research

The company has continued to strengthen its range in the belief that it needs to establish key models to gain a strong foothold in each weight category, and to reduce its earlier heavy reliance on the mining industry. Last year, Volvo recorded growth of 164 per cent and expanded its market share to 4 per cent after it sold over 3,600 units in the domestic market. Very importantly, only 5 per cent of sales came from the smallest sector 6.1-8.0 tonnes, which was the lowest among all major suppliers, suggesting it has relatively higher revenues per unit sold.

Off-Highway Research

The recently launched EC120D has remained its bestselling model and boosted its share in the 8.1-19.0 tonne sector, while the 90 tonne EC950EL made it the third largest supplier in the over 80 tonne sector.

MINI EXCAVATORS

Table 12. Volvo CE: Mini Excavators Available in China, 2018

Model	Engine		Service Weight (Tonnes)	Product Source
	HP	Manufacturer		
EC18D	16	Volvo	1.8	France
EC55D	49	Volvo	5.4-5.6	Linyi
EC60D	49	Volvo	5.6	Korea
EW60C**	56	Volvo	5.7	Korea

** Wheeled

Source: Off-Highway Research

Volvo began production of its EC55B model in 2004 in Shanghai, but the company was not regarded as being a major producer for the next four years when annual output remained below 400 units. Production was moved to SDLG's plant in Linyi in 2009, and output then increased to 900 units. Production peaked at 2,000 units in 2011 and fell annually after then to 400 units in 2015. Besides the localised EC55D model, the company imports the EC60D crawler model, and the wheeled EW60C model, but both in small volumes. Recently, it added the smaller EC18D model to its product range.

**Table 13. Volvo CE: Production and Sales of Mini Excavators in China, 2013-2017
(Units)**

	2013	2014	2015	2016	2017
Production	1,000	850	400	300	800
Sales	1,270	1,060	490	390	990

Source: Off-Highway Research

Volvo began selling mini excavators in China in 2004, but only really made its presence felt in 2009 when its sales reached 900 units. Sales peaked in 2011 when it sold almost 1,900 units, and its market share grew to 5 per cent. Despite declining domestic demand, Volvo managed to maintain its share in 2012 and 2013 and sold over 1,000 units a year until 2014. However, like many international participants in this competitive market where customers are very price sensitive and increasingly reluctant to pay for a premium product, the company started to see its sales and market share decline to 390 units and 2 per cent in 2016. Last year, a very strong recovery was achieved after it more than doubled sales and grew its market share to 3 per cent.

ROAD MACHINERY

Volvo entered the road machinery sector through the acquisition of Ingersoll-Rand's road machinery business in 2007. It closed the IR (Wuxi) factory that assembled compaction equipment and ABG asphalt finishers and moved its operations to the premises of SDLG in Linyi. Manufacturing was suspended for more than a year before Volvo re-established its road machinery production line in a leased facility from SDLG.

Table 14. Volvo CE: Asphalt Finishers Available, 2018

Type	Model	Paving Width (m)	Engine		Product Source
			HP	Manufacturer	
Crawler	P6820C ABG	2.5-9.0	193	Volvo	Germany, Linyi
	P8720B ABG	2.5-9.0	231	Volvo	Linyi
	P7820C ABG	2.5-11.0	238	Volvo	Germany, Linyi
	P8820C ABG	2.5-13.0	268	Volvo	Germany, Linyi
Wheeled	P5770C ABG	2.5-7.0	175	Volvo	Germany
	P5870C ABG	2.5-8.0	175	Volvo	Germany
	P6870C ABG	2.5-9.0	175	Volvo	Germany

Source: Off-Highway Research

Table 15. Volvo CE: Compaction Equipment Available in China, 2018

Type	Model	Operating Weight (Tonnes)	Engine		Product Source
			HP	Manufacturer	
Tandem	DD25B	2.5	25	Volvo	Germany
	DD120	12.8	152	Cummins	Linyi
	DD140	13.9	173	Cummins	Linyi
Self-Propelled	SD200D	20.6	205	Cummins	Germany

Source: Off-Highway Research

By 2008 output of asphalt finishers had almost stopped but manufacturing activities were normalised in 2009, and since then Volvo has been assembling asphalt finishers for paving the asphalt surface layer, including three models designated the ABG6820, ABG7820B and ABG8820B.

**Table 16. Volvo CE: Production of Road Machinery China, 2013-2017
(Units)**

	2013	2014	2015	2016	2017
Asphalt Finisher	80	80	66	100	137
Compaction Equipment	100	60	40	40	50

Source: Off-Highway Research

On 26 February 2014, Volvo launched a new asphalt finisher, the P8720B model, for the Chinese market aimed at placing the soil layer, which is powered by a 231 horsepower Volvo diesel engine that conforms to Tier 3 emission standards. This features a basic paving width of 2.5 metres and a maximum paving width of 9.0

metres. This is a reflection of the company realising its leading position in traditional surface layer paving and understanding the importance of machines for the placing of soil layer that is dominated by indigenous manufacturers. Along with the launch of the new C series, compliant with China Stage 3 emission standards, production of the B series will be phased out.

As with the overall demand structure in China, its sales of asphalt finishers are dominated by wheeled products, and the company lost its prominence in this sector following the closure of IR's Wuxi factory. With production being around 100 units each year during 2013-2016, it held a 4-6 per cent share, but the company managed to increase its sales sharply in 2017 when the domestic market recovered very strongly.

**Table 17. Volvo CE: Sales of Road Machinery China, 2013-2017
(Units)**

	2013	2014	2015	2016	2017
Asphalt Finishers	75	76	72	109	159
Compaction Equipment	139	64	46	56	49

Source: Off-Highway Research

The current offering of compaction equipment is made up by three models of tandem rollers for paving applications, and one self-propelled model for soil compaction. Again, the company is losing the traditional strengths of its predecessor in this product sector, and sales have remained modest over the last five years.

WHEELED LOADERS

Table 18. Volvo CE: Wheeled Loaders Available in China, 2018

Model	Engine		Operating Weight (Tonnes)	Bucket Size (m ³)	Product Source
	HP	Manufacturer			
L120Gz	240	Volvo	18.1	3.5	Linyi
L150H	295	Volvo	24.1-25.6	2.7-9.5	Sweden
L180H	329	Volvo	27.0-28.4	2.7-9.5	Sweden
L220H	366	Volvo	31.2-33.1	2.7-9.5	Sweden
L260H	414	Volvo	34.0-39.0	5.3-10.2	Sweden
L350F	528	Volvo	50.0-56.0	6.2-12.7	Sweden
L350H	535	Volvo	50.0-56.0	6.2-12.7	Sweden

Source: Off-Highway Research

With over 60 years of experience in manufacturing wheeled loaders, the strength of the association between the Volvo brand and this product is so powerful that in many places, especially in certain countries in Europe, the company name and the machine are synonymous with each other.

Before 2013, Volvo only sold imported wheeled loaders in China. The volumes remained quite modest in this market, where the overwhelming majority of customers are happy with the much more affordable indigenous products of 120-220 horsepower and are reluctant to pay for premium products. As a result, its sales efforts were concentrated on large models over 300 horsepower targeted at niche segments. Sales struggled to reach 100 units a year.

At the end of 2012, Volvo started to produce a single model, the 224 horsepower L105, in SDLG's Linyi factory. This machine was designed and developed specifically by its technology centre in Jinan to meet the needs of its Chinese customers. The company's sales reached 100 units in 2013 and 200 units in 2014, but demand was below expectations and production ceased in 2016.

Table 19. Volvo CE: Sales of Wheeled Loaders in China, 2013-2017

	2013	2014	2015	2016	2017
Units	110	200	60	45	50

Source: Off-Highway Research

In 2017 sales reached 50 units and the localisation of another model, the 240 horsepower L120Gz started in Linyi. Except for this model, the other six models available in China are produced in Sweden, and these are larger machines ranging from 295 to 535 horsepower. Most of them have now been updated to the H Series featuring new powertrains, new hydraulics and new control systems such as Automatic Climate Control, Load Assist and OptiShift. Compared to the F series, the new series offers higher productivity, improved fuel efficiency, lower emissions, greater lifting capability, improved breakout force as well as improved serviceability

and operator comfort. For the foreseeable future, Volvo will doubtless continue to be the largest importer of wheeled loaders into China.

MARKETING AND DISTRIBUTION

Table 20. Volvo CE: Distribution in China, 2018

Distribution Management	VCEIC
No. of Dealers	43
Authorised Second-hand Equipment Maintenance Centres	4
Sales and Service Outlets	290

Source: Off-Highway Research

Volvo CE was one of the earliest international companies to enter the Chinese market, and thanks to its long standing commitment it has established one of the best distribution networks in the country. The company now has 43 dealers, all of which hold full-line franchises. While a great majority of them operate exclusively in their franchised regions, several dealers focus on major projects and key accounts nationwide.

Most dealers have partnered with Volvo CE for over a decade, and are well known for their professionalism, sophistication and local resources. Together, they have some 290 sales and service outlets across the country, with over 1,500 service engineers providing customer support.

Shanghai is where technical training, support and service centre, and the remanufacturing centre are based. There are also four authorised second-hand equipment maintenance centres run by its dealers, as well as seven Competence Development Centres located in Urumqi, Shenyang, Zhengzhou, Wuhan, Fuzhou, Guangzhou and Chengdu.

Like most dealers in the market, many of the company's dealers experienced varying degrees of financial troubles when the market downturned after 2011. Unlike some of its rivals that took a financial stake in, or total control of their dealers, even to the extent of taking legal action against them, Volvo CE has always been adamant on maintaining the independence of its dealers. In addition, it made a bold and timely decision to offer various dealer recovery programmes, which have included buying back repossessed machines from dealers to improve their cash flows. The aim was to help dealers resume normal operations, something that has been much appreciated by dealers and has played a critical role in boosting the company's performance once the market recovered.

The company is adept at holding high-profile publicity and sponsorship events. Beside the Operator Idol, the Volvo Ocean Race has been regarded as one of the leading sport events in China. When the 2011-2012 race stopped over in Sanya, Hainan, a crowd of 3,000 people made up of dealers and customers were invited to the event as an appreciation of Volvo's ongoing relationship with its Chinese

customers. In June 2018, Volvo CE celebrated 60 years of live demonstrations at Volvo Days in Sweden with over 7,000 customers from more than 70 markets including China. A total of 70 machines and vehicles from Volvo CE and Volvo Trucks were displayed, with the latest Volvo R70D and R100E rigid dump trucks on show.

The company has also steadily built up its brand equity through good after-sales service and support. The Customer Care Upgrading Campaign was first initiated in 2012 and has benefited over 10,000 customers across the country. In addition, the company has developed mobile service stations, the so-called “yellow box”, providing 24-hour on-site service and parts supply which has dramatically increased the availability of its machines in remote areas. Following the successful launch of its onboard telematics system monitoring machine performance CareTrack, a new Volvo Service package will be officially launched during bauma China at the end of 2018.

EXPORTS

Exports are not a major feature of Volvo's operations in China, but it does sell overseas small volumes of compaction equipment, mini excavators and wheeled loaders produced in Linyi, as well as one model of crawler excavator, the EC170D sourced from Shanghai, while the L120Gz wheeled loader is the latest to be included. The average annual volume of exports over the last five years has been 180 units, but thanks to the increasing exports of wheeled loaders produced in Linyi and the improved demand for compaction equipment, the first half of 2018 saw exports reach 250 units.

In addition, its products have always been favoured by Chinese customers that are working on overseas projects, which place orders in China and send machines to work abroad. Among them are some of the world's largest contractors in the world, such as China State Construction Engineering and China Communication Construction.

Off-Highway Research

HEAD OFFICE

Chris Sleight

Off-Highway Research
Southfields,
Southview Road,
Wadhurst
East Sussex TN5 6TP
United Kingdom
T: +44 (0)1892 786205
F: +44 (0)1892 784086
E: chris.sleight@offhighwayresearch.com
www.offhighwayresearch.com

CHINA OFFICE

SHI Yang

Off-Highway Research
Room 2102,
Air China Plaza
No.36 Xiaoyun Road
Chaoyang District
Beijing 100027
China
T: +86 10 8447 5877
F: +86 10 8447 5878
E: china@offhighwayresearch.com
www.offhighwayresearch.com

INDIA OFFICE

Samir Bansal

Off-Highway Research
Flat No. 111
Chiranjiv Tower
43, Nehru Place
New Delhi – 110019
India
T: +91 11 4652 5671 - 73
F: +91 11 4652 5674
E: india@offhighwayresearch.com
www.offhighwayresearch.com

SALES OFFICES

GLOBAL

Simon Battersby

Sales Account Manager
T: +44 (0)1892 786232
E: simon.battersby@offhighwayresearch.com

FRANCE & BELGIUM

Hamilton Pearman

T: +33 1 45 93 08 58
E: hpearman@wanadoo.fr

ITALY

Fabio Potesta

Mediapoint and Exhibitions
T: +39 010.5704948
E: info@mediapointsrl.it
www.mediapointsrl.it

JAPAN

M Kawahara

Rayden Research Limited
T: +81 3 3212 3671
E: kawahara@ff.ijj4u.or.jp
www.rayden.jp

TURKEY

Emre Apa

Apa Yayincılık Ltd
T: +90 216 302 53 82
E: emre.apa@apayayincilik.com.tr
www.apayayincilik.com.tr

USA

Charles R. Yengst

Yengst Associates
T: +1 203 762 8096
E: mail@yengstassociates.com
www.yengstassociates.com

Buy online at:

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