

COMPANY PROFILE:

LIUGONG

NOVEMBER 2006

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INTRODUCTION

The subject of this report is **Guangxi Liugong Machinery Co. Ltd.**, one of the largest Chinese construction equipment manufacturers, and more simply known as **Liugong**. The company is listed on the Shenzhen Stock Exchange, and is the core operational unit of its parent company, the **Liugong Group**. Since its foundation more than forty years ago, Liugong has grown into one of the leading domestic manufacturers, and the 'Liugong' brand has become one of the most respected names in the Chinese industry. Its current product range extends from wheeled loaders, hydraulic excavators and road machinery to compact equipment. A further extension of the range, both in depth and breadth, may be expected in the near future.

This report is an update of the Liugong profile that was last published by Off-Highway Research in October 2002. Since then both the Chinese industry and Liugong itself have witnessed significant developments, and Liugong has achieved major changes both in its product range and its manufacturing capabilities. It has also radically revised its corporate strategy to focus on being a global participant.

SUMMARY

Table 1. Liugong: Statistical Summary, 2001-2005

	Sales (RMB Mns)	% Exports	Net Profit (RMB Mns)	Employees	Production of Key Products (Units)		
					Wheeled Loaders	Crawler Excavators	Compaction Equipment
2001	977.6	1.5	21.5	2,677	3,988	122	208
2002	1,701.1	2.1	123.6	2,756	7,847	163	358
2003	2,493.4	1.2	223.9	2,731	12,040	379	573
2004	3,509.1	2.5	243.7	2,677	15,492	554	593
2005	4,069.9	6.0	208.2	3,998	17,201	875	520

Source: Off-Highway Research

HISTORICAL DEVELOPMENT

Table 2. Liugong: Historical Highlights, 1958-2006

Highlights	
1958	Founded when Shanghai Huadong Iron & Steel Construction Plant was partly relocated to Liuzhou.
1960	Launch of an 80 horsepower crawler dozer and a 2-6 tonne tower crane, its first construction equipment products.
1966	Development of the first wheeled loader model, the Z435.
1971	Development of the articulated wheeled loader, the Z450, the first 210 hp model in China.
1976	Launch of the ZL90 (400 hp) wheeled loader, and the DZL loader for underground mining.
1989	Development of the ZL60E and ZL100 loaders using technology from Caterpillar's 966E and 988B models.
1992	Development of the WY40 hydraulic crawler excavator.
1993	Guangxi Liugong Machinery Co. Ltd is established, becoming the first public company in the construction equipment industry.
1995	Enters the compaction equipment sector with the YZ110C self-propelled roller. Sets up a joint venture with Case to produce backhoe loaders, which ended in 1998. Established a joint venture with ZF of Germany to produce axles and transmissions. Liugong transfers its shares in this operation to its parent company in 2001.
2000	Founded Jiangyin Liugong Road Machinery by acquiring a local factory in Jiangsu.
2001	Launched the ZLG50G wheeled loader, the first domestic high altitude model in China.
2002	Liugong Group sets up Shanghai Liugong Forklift Truck by acquiring Shanghai Forklift Truck.
2003	Liugong Group sets up Yangzhou Liugong Construction Machinery by merging with a local factory in Jiangsu.
2004	Launch of the CLG375 and CLG380 skid-steer loaders.
2005	Re-organised the company structure by forming six business divisions – wheeled loaders, excavators, road machinery, compact equipment, spare parts and exports. Announced new company logo at BICES, symbolizing its international strategy.
2006	By April, total output of wheeled loaders had reached 100,000 units.

Source: Company Information

Liugong traces its history back to 1958, when it made steel components for oilfield development. Two years later it developed an 80 horsepower crawler dozer, and 2-6 tonne tower cranes, marking its entry into the construction equipment industry. In 1966 it started to manufacture the 135 horsepower Z435 model wheeled loader based on a Japanese design, which heralded its entry into the wheeled loader sector. In 1971 the company developed the first Chinese articulated wheeled loader, the ZL50 model which was based on the Euclid 72-51; this was then designated by the government to be a standard design.

Between 1984 and 1986, the former Ministry of Machinery arranged a co-operation between 12 domestic manufacturers and Caterpillar, to introduce some of the latter's wheeled loader and crawler dozer models, together with relevant key components; Liugong, Xiamen and Yigong were designated to acquire the wheeled loader technology. By employing the designs of Caterpillar's 966E and 988B models, Liugong developed the ZL60E and ZL100 models in 1989, and similar technology was also applied to its ZL40B and ZL50C models.

Liugong was restructured into a joint stock company in 1993, with a registered capital of RMB200 million, and was then floated as a public company on the Shenzhen Stock Exchange.

In 1995 Liugong embarked on two co-operation projects. The first was a joint venture with Case to make backhoe loaders but this was terminated in 1998. The second partnership was longer lived and continues successfully today: Liuzhou ZF Machinery was formed with the German manufacturer ZF (Liugong holding 49 per cent and ZF 51 per cent) to make axles and transmissions, with Liugong transferring its shares to the Liugong Group in 2001; this joint venture has now become a major component supplier to the domestic construction equipment industry.

In 1993, the first year it became a public company, Liugong recorded annual sales of over 3,000 wheeled loaders. However, it witnessed a fall in demand in later years, with the market being depressed by the government's fiscal policy to curb inflation, and it was not until 1998 that Liugong restored production to 2,900 units. Since 1998, the industry has benefited from the proactive fiscal policy which has greatly stimulated demand for construction equipment. Liugong has achieved strong and steady growth in wheeled loader sales, from 2,791 units in 2000 to 15,984 units in 2005, and is now the market leader with a share of 15 per cent.

Although the market for wheeled loaders has been expanding very rapidly recently, profit margins have been very severely squeezed by the fierce price competition among manufacturers. In spite of this very difficult environment, Liugong has maintained a better profitability than most by strictly controlling its production costs and has been able to take advantage of great economies of scale.

In the early part of this decade, Liugong began to broaden its product range to include crawler excavators, road machinery and compact equipment, in a bid to avoid an over reliance on its core product, the wheeled loader. In August 2000, **Jiangyin Liugong Road Machinery** was established through the acquisition of a local factory specialising in compaction equipment. In November 2003 **Jiangsu Liugong Machinery** was formed in Zhenjiang, Jiangsu Province, and this is now the centre of its compact equipment operations.

In recent years Liugong has also been actively exploring its opportunities in overseas markets. Distribution networks have been established in Central and South Asia, the Middle East and Africa and recent progress has been achieved in the penetration of the more developed markets of Europe and North America. In 2004, a subsidiary sales company was set up in Australia, a market that has become of increasing interest.

In 2005, a leaner company structure was put in place to meet the requirements of Liugong's strategic development, and six major business divisions were formed, including one that focused on exports. In November of that year, a new company logo was launched at BICES, to symbolise its strategy of becoming a global company.

In April 2006, Liugong celebrated the production of 100,000 wheeled loaders in the 40 years since it entered the industry, the first Chinese manufacturer to have achieved this milestone. In the next five years its target is to produce another 100,000 units.

COMPANY STRUCTURE

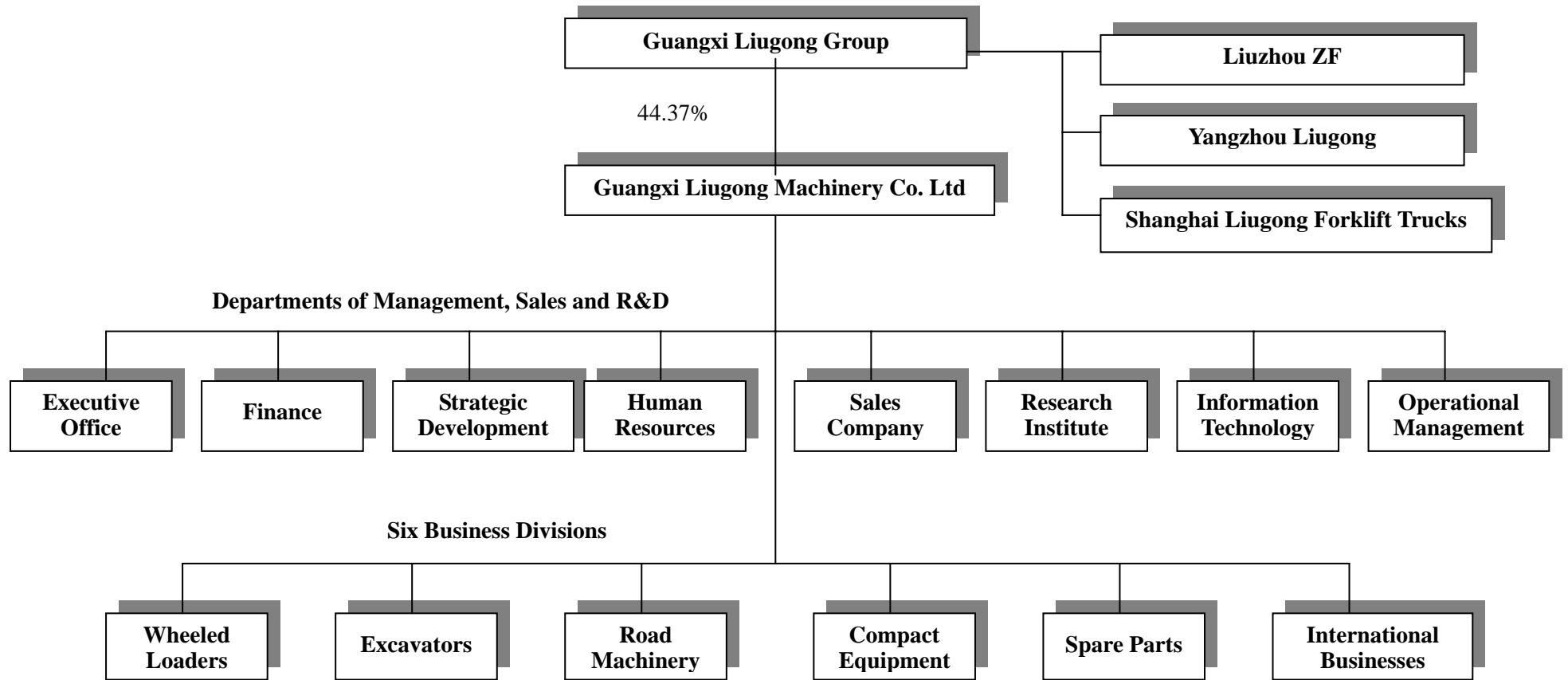
Table 3. Liugong: Ownership Structure, 2006

	Shares of Equity	%	Remarks
Guangxi Liugong Group	209,614,147	44.37	Conditionally tradable
Public Shares	262,842,032	55.63	
Total	472,456,179	100.00	

Source: Company Information

Liugong is a public company listed on the Shenzhen Stock Exchange. The Liugong Group holds 44.37 per cent of its shares and represents the state interest in the company, while the real controller is the State-owned Assets Supervision and Administration Commission of the Guangxi Government. The remaining 55.63 per cent are public shares that are floated on the stock market.

Table 4. Liugong Organisation Chart, 2006



Liugong has eight departments in charge of administration, sales and R&D respectively, among which: (the version we sent to you)

The **Sales Company**, which is in charge of domestic sales, divides the market into six regions, in which there are 30 representative offices. Other affiliated companies in the Liugong Group may also make use of this network.

The **Research Institute**, which was formed out of the former R&D Centre, has six specialised divisions for different products and relevant service departments.

In line with the increasingly diversified product lines and to develop its overseas distribution, in September 2005 Liugong formed six business divisions for wheeled loaders, hydraulic excavators, road machinery, compact equipment, parts and overseas business.

The **Wheeled Loader Division** consists of nine manufacturing units, responsible for assembly, steel fabrication, energy supply, sheet metal, axles and transmissions, hydraulics parts, thermal processing, foundry and the manufacture of tools and moulds.

The **Excavator Division** manages **Liuzhou Liugong Excavator Co. Ltd**, which was formed out of the original Excavator Branch in 2006. The registered capital is now RMB175.1 million, with the main products being crawler excavators and mini excavators.

The **Road Machinery Division** is made up of two companies:

- **Jiangyin Liugong Road Machinery Co. Ltd**, which was founded in August 2000 through the acquisition of the Jiangsu Jiangyin Transport Construction Machinery Plant for a sum of RMB11.22 million, an operation that specialises in the production of compaction equipment. The registered capital is RMB30.3 million, and Liugong holds an 89.14 per cent equity stake.
- **Liuzhou Liugong Road Machinery Co. Ltd**, which was known as **Liuzhou Liugong Structural Component Co. Ltd** before March 2006, and was formed through the merger of Liuzhou Kangda Construction Machinery and Liuzhou Liugong Compact Loader. The registered capital is RMB118.4 million, of which Liugong owns 94.37 per cent. Apart from manufacturing steel components for wheeled loaders and excavators, it will gradually give priority to the production of road machinery, including cold planers, asphalt finishers and motor graders.

The **Compact Equipment Division** controls **Jiangsu Liugong Machinery Co. Ltd.**, which was established in November 2003. Of its registered capital of RMB87 million, Liugong holds 92.59 per cent. The current product range includes wheeled loaders under 150 horsepower, skid-steer loaders and backhoe loaders. This is Liugong's manufacturing base for all compact equipment, except for the mini excavators that are currently being produced in Liuzhou.

The **Spare Parts Division** manages **Liuzhou Liugong Machinery Parts Co. Ltd.**, which was established in 2000 out of the former Liugong Parts Centre, and is responsible for the distribution of spare parts. It used to be shared between Liugong and the Liugong Group, but became wholly owned in 2006 by Liugong.

The **International Business Division** manages overseas distribution through local branches and distributors. **Liugong Machinery (Australia) Co. Ltd.**, which conducts sales, after sales service and rental, is also under its control.

In addition, Liugong has several affiliates, including **Liuzhou ZF** in Liuzhou, **Yangzhou Liugong** in Yangzhou (producing concrete machinery) and **Shanghai Liugong Forklift Trucks.** However, these operations are now controlled or shared by the Liugong Group, and fall outside the scope of this report.

FINANCIAL DATA

Since 2000 Liugong has effectively improved its financial results through a series of measures that have included increasing sales, reducing production costs, extending into compaction equipment and excavators, as well as transferring its shares in Liuzhou ZF when it was making a loss. With increased domestic demand and improved overseas sales, Liugong has seen strongly improved revenues and levels of profitability.

Between 2001 and 2003, sales improved in all product sectors, and net profit substantially improved to RMB223.9 million. In 2004, although the market as a whole was depressed by government economic regulations, Liugong achieved levels of sales well above the industry average in all its key products, and even in that challenging year sales and profits moved ahead strongly.

In 2005, Liugong saw strong growth in revenues of 16 per cent to RMB4,070 million, a record level that can be attributed to the continued growth in demand for both wheeled loaders and hydraulic excavators. Net profit was reduced, however, because of the escalating costs of raw

materials and the intensified price competition, but even so profitability remained above average for the industry.

Table 5. Liugong: Financial Highlights, 2001-2006
(RMB Million)

	Sales					Net Profit
	Wheeled Loaders	Crawler Excavators	Compaction Equipment	Others	Total	
2001	850.8	11.8	47.1	67.8	977.6	21.5
2002	1,469.6	54.8	71.8	104.9	1,701.1	123.6
2003	2,187.4	121.2	129.2	55.6	2,493.4	223.9
2004	3,012.2	258.1	123.6	115.1	3,509.0	243.7
2005	3,395.9	375.3	104.7	194.0	4,069.9	208.2
2006*	2,223.6	306.8	61.2	145.4	2,737.0	198.3

*January to June

Source: Company Information

In the first half of 2006, sales reached RMB2.737 billion, a year-on-year growth of 21 per cent, thanks largely to the recovering market, but the improvement also reflects the change in business structure and the company's increased marketing efforts. During this period net profits saw much improved growth of 55 per cent to RMB198 million, almost equal to the results of the full year in 2005.

The past five years have also seen a substantial increase in export sales, which rose in value from RMB14.3 million in 2001 to RMB261 million in 2005. Exports now account for six per cent of company sales, and are playing an increasingly important role in the company's financial health. In the first half of 2006, the company saw a 275 per cent growth in exports to RMB231 million, almost as much as for the whole of 2005. Total export sales are expected to exceed RMB400 million by the end of 2006.

An analysis of performance by product shows that the major portion of Liugong's sales come from wheeled loaders, followed by crawler excavators and compaction equipment:

Wheeled Loaders: This sector is the company's largest source of revenues. It accounted for as much as 95 per cent of sales before 2000, but is now down to around 86 per cent as a result of the broadened product range that has emerged in recent years. Total sales rose from RMB851 million in 2001 to RMB3,396 million in 2005, partly as result of the huge growth in the market overall, but also because of the company's ability to maintain market share at around 15 per cent

in the face of formidable competition. Profitability remains respectable; gross margins were above 20 per cent in 2002-2003 and then dropped to 17 per cent in 2004-2005. However, this level has returned to 20 per cent in the first half of 2006 as a result of contained production costs and improved economies of scale.

Crawler Excavators: Significant growth began in 2002, when the company upgraded its products to include imported key components, and sales reached RMB54.8 million in that year. By 2005, sales had grown to RMB375.3 million, representing nine per cent of total revenues, and in the first half of 2006 sales had further improved by 80 per cent to RMB306.8 million. Gross margins have improved to 17 per cent, making it the second most profitable sector after wheeled loaders.

Compaction Equipment: Sales moved ahead to RMB47.1 million in 2001, after which the company enjoyed over 50 per cent growth in both 2002 and 2003. However, with the depressed market since 2004, sales dropped back to RMB104.7 million in 2005, representing roughly three per cent of company sales.

MANUFACTURING FACILITIES

Liugong's main factory is located in Liuzhou City in the Guangxi Zhuang Autonomous Region (GZAR), located in the southwest of the country. The main factory was built in 1966 and has always been the heart of the company's wheeled loader production. In recent years, the strategy of diversification has led to an enormous expansion of production facilities both in Liuzhou City, and the development in Jiangsu Province in eastern China.

The manufacturing facilities in Liuzhou can now be divided into three, each covering a specific product range. **No. 1 Factory** has the longest history and is also the location of the company's headquarters. It produces all sizes of wheeled loaders and has an annual capacity of 25,000 units, with nine major workshops for assembly, steel fabrication, foundry, axles and transmissions and other operations. The factory has been substantially improved since the mid-1990s and the majority of its facilities are up to date, well laid out and are very cost effective. Liugong plans to invest a further RMB324 million in setting up a new fabrication plant and a stock centre, as well as upgrading its technology in the production of axles, transmissions and hydraulic parts, a process which is scheduled to be completed by 2011.

Table 6. Liugong: Manufacturing Facilities, 2006

Location	Land Area (m ²)	Covered Area (m ²)	Employees	Product Range	Annual Capacity (Units)
Liuzhou, Guangxi					
– No. 1	1,207,800	597,400	3,000	Wheeled Loaders	25,000
– No. 2	197,200	20,800	240	Crawler Excavators	1,500
				Mini Excavators	
– No. 3	66,330	28,850	722	Asphalt Finishers	
				Motor Graders	
				Cold Planers	
				Parts and Components	
Jiangsu					
– Jiangyin	30,000	11,000	240	Compaction Equipment	1,000
- Zhenjiang	120,000	20,000	200	<150 hp Wheeled Loaders	4,000
				Skid-steer Loaders	
				Backhoe Loaders	

Source: Company Information

No. 2 Factory is located in Labao Town, about 20 kilometres from the main No.1 factory, and specialises in the production of hydraulic excavators and mini excavators. It has a steel fabrication hall and an assembly operation consisting of two lines, while a plate cutting hall will soon be added. The current annual production capacity is 1,500 units, but this will soon be at least doubled following the acquisition of adjoining land which will result in a 40,000 m² covered manufacturing facility.

The **No. 3 Factory** in the past used to focus on the production of parts and components, but now is gradually being converted to produce the company's road machinery products, which include motor graders, asphalt finishers and cold planers. The production of road machinery currently takes place in a 4,000m² assembly hall and will be given greater priority in the future.

In addition, Liugong owns two factories in Jiangsu Province, both of which are located in riverside cities along the Yangtze.

Jiangyin Liugong is located in Jiangyin City, and manufactures compaction equipment with a capacity to produce 1,000 units a year. The factory now focuses on the production of mechanically-driven self-propelled rollers, a traditional Chinese product but will increase its output of hydrostatic models and tandem rollers. To improve its manufacturing capacity, Liugong has decided to relocate the factory to Yunting Town in the city's suburbs, where it has

land of 100,000 m²; Liugong plans to build a 20,000m² new facility here with an investment of RMB20 million. The new factory is expected to be opened by the end of 2007.

Jiangsu Liugong is located in Zhenjiang City and specialises in compact equipment, although the majority of production at the moment focuses on wheeled loaders under 125 horsepower. This modern factory was completed in 2004 to international standards, and had revenues of RMB328 million in 2005. The location was chosen for its relatively well developed local industry that can supply it with components, its ability to sell into the more developed eastern provinces, as well as assisting with exports. Priority will in future be given to the production of compact loaders, skid-steer loaders and backhoe loaders, and in order to meet anticipated demand, a new 7,000m² workshop will be added in 2007.

CORPORATE STRATEGY

Liugong has a philosophy of being ‘a client-oriented total solution provider’, and is determined to maintain its independence. It has set itself the ambitious goal of achieving sales of more than RMB10 billion by 2010, of which 15 per cent will be generated from exports. While maintaining its prime position in the domestic market for wheeled loaders, Liugong will increasingly prioritise the importance of its other businesses of hydraulic excavators, road machinery and compact equipment, and significant efforts will be made to increase its export activities. In sum, it wants to become a genuine global operator, and a world-class manufacturer.

In pursuit of a more diversified and international strategy, in September 2005 Liugong re-organised its management structure by setting up six major business divisions. At the same time the company raised its employees’ awareness of the company’s mission, vision and core values through intensive training and publicity.

The strategy of diversification is characterised by its focus on a number of new products, with the aim being to improve the company’s resistance to market risk through a broader product range. Unlike other domestic manufacturers, Liugong prioritises the medium to high quality end of the market, where customers tend to attach greater importance to quality and service rather than an emphasis on price.

Distribution now wholly relies on independent dealers, and the earlier practice of direct sales, which accounted for 20 per cent of orders as little as five years ago, has been abandoned. To improve its distribution system, Liugong has adopted a rigorous procedure of evaluating its dealers and continually regulates their performance. To cope with its increasingly diversified

product range, it has re-structured its distribution network that used to only focus on wheeled loaders; the domestic market is now divided into six regions, and in each region there are specialist product managers in charge of individual products. To improve customer service, a computerised information system is now available to enable direct links between dealers and Liugong, so as to shorten the response time to customers' requirements.

Liugong formed the strategy 'to become global' in 2002, when it first put forward the concept of 'an international Liugong'. It puts up leading international manufacturers as benchmarks so that it can improve its product quality to the standards commonly accepted in the developed markets of Europe and North America, an action which is coupled with the development of its overseas distribution. The move to becoming a genuine international manufacturer was then reinforced by establishing an international business division. The export development of Liugong is thought to be unique amongst Chinese manufacturers, in that it attaches greatest importance to Europe and North America, instead of merely focusing on the developing countries, even though it is realised that it will take many years to establish itself in the more sophisticated markets.

Thanks to its product diversification and international strategy, Liugong has seen rapid expansion in both its product range and export sales. In terms of sales, in 2005 Liugong was the largest independent entity in the Chinese construction equipment industry.

RESEARCH AND DEVELOPMENT

Liugong's R&D capability is a distinctive strength, and in this field it claims to be a leader amongst Chinese manufacturers. Its R&D workforce comprises about 280 staff, which includes those employed in its Jiangsu factories. Annual investment into its R&D activities represents around three per cent of revenues.

The current Research Institute was formed in September 2005 out of the restructuring of the former Technology Centre. In comparison with its predecessor, it now conducts product development in a more specialised way, and the resources are more evenly shared between different divisions.

Table 7. Liugong: Summary of the Research Institute's Activities, 2006

Divisions	Location	Coverage of R&D Activities
Wheeled Loaders	Liuzhou	151-336 horsepower wheeled loaders
Excavators	Liuzhou	Hydraulic excavators and mini excavators
Road Machinery	Liuzhou, Jiangyin	Compaction equipment, motor graders, asphalt finishers, soil stabilisers, and cold planers
Compact Equipment	Zhenjiang	Under 150 hp wheeled loaders, skid-steer loaders, and backhoe loaders
Testing	Liuzhou	Testing new products
Electromechanical Integration	Liuzhou	Control systems of construction equipment
New Materials	Liuzhou	New materials and associated technologies
Technical Standards	Liuzhou	Standards, patents, and quality certification
Technological Planning	Liuzhou	New programmes and data management
Technical Support	Liuzhou	Talent management

Source: Company Information

The Institute is made up of specialist divisions, each focusing on a particular product sector or a designated function, and the supporting departments. The product divisions, namely wheeled loaders, excavators, road machinery and compact equipment, are co-managed between the Institute and the relevant business divisions; as a result the various independent business divisions are all able to share the resources of the Institute.

There are now a number of new products under development. These include 220 horsepower, five-tonne wheeled loaders that feature eight-bar parallel linkage; compact loaders of 0.8-1.0 tonne loading capacity; crawler excavators in the 30-40 tonne weight classes; 700 kilogramme skid-steer loaders and pneumatic-tyred rollers. The products which are prioritised are those that have the greatest export potential and there is an emphasis on their being able to be accepted in the more developed markets. The immediate task is to upgrade the 125-320 horsepower range of wheeled loaders to meet CE requirements.

Liugong, while insisting on its future independence, welcomes co-operation with foreign manufacturers and suppliers to introduce more advanced technology to reduce machine noise, the optimisation of engine cooling systems, and the improvement of operator comfort.

COMPONENT SOURCING

As a major state-owned manufacturer, Liugong has a comprehensive component production system that allows it to be largely self-sufficient in most components, including castings, fabrications, transmissions, axles, sheet metal, hydraulic valves, pipes and cylinders. As for

wheeled loaders, it produces in-house all of its component requirements except for engines, hydraulic pumps, tyres and electronics.

Table 8. Liugong: Component Sourcing for Key Products, 2006

	Wheeled Loaders	Crawler Excavators	Mini Excavators
Engines	Weichai, Shanghai Diesel, Yuchai, Luoyang, Dongfeng Cummins, Cummins USA	Cummins USA	Quanchai
Transmissions	In-house, Liuzhou ZF	-	-
Axles	In-house, Liuzhou ZF	-	-
Hydraulic Pumps	Jinan, Tianjin Permco	Kawasaki, Toshiba	Toshiba
Hydraulic Motors	-	Shanghai Nabtesco	Shanghai Nabtesco
Hydraulic Valves	In-house, Linhai, Bosch Rexroth, Kawasaki	Kawasaki, Toshiba	Toshiba
Hydraulic Cylinders	In-house, Shandong, Bosch Rexroth, Kawasaki	Kayaba	Kayaba
Cabs	In-house, Local	Local	Local
Structural Parts	In-house	In-house	In-house
Tracks	-	Tianjin AsiaTrak, ITM	Tianjin AsiaTrak
	Compaction Equipment	Skid-steer Loaders	Backhoe Loaders
Engines	Shanghai Diesel, Cummins USA	Deutz , Cummins USA	Cummins USA
Transmissions	In-house	-	Carraro
Axles	In-house	-	Carraro
Hydraulic Pumps	Sauer-Danfoss	Sauer-Danfoss	Bosch Rexroth, Sauer-Danfoss
Hydraulic Motors	Bosch Rexroth	Sauer-Danfoss	-
Hydraulic Valves	Husco	Husco	Husco
Hydraulic Cylinders	In-house	In-house	In-house
Cabs	In-house	In-house	In-house
Structural Parts	In-house	In-house	In-house
Tracks	-	-	-

Source: Company Information

In recent years, Liugong has increased its proportion of international sourcing with the broadening of its product range, and greater emphasis is being placed on achieving export quality. For instance, in its crawler excavators Liugong uses only components that are sourced from international suppliers, either from their overseas locations or from their factories in China. Diesel engines are sourced from all the major domestic suppliers, while Cummins engines are used on crawler excavators and other products destined for the more demanding export markets.

Over the next five years, Liugong is to invest heavily in upgrading its production of transmissions and hydraulic cylinders, with new facilities being added and up-to-date manufacturing tools being purchased. In addition, it has shown its desire to co-operate with

leading international suppliers to develop its capability to manufacture hydraulic components, especially pumps, valves and motors.

EQUIPMENT ANALYSES

Liugong now covers the following range of construction equipment:

- Wheeled Loaders
- Crawler Excavators
- Compaction Equipment
- Mini Excavators
- Motor Graders
- Skid-steer Loaders
- Backhoe Loaders
- Asphalt Finishers
- Cold Planers
- Soil Stabilisers

Wheeled Loaders

Table 9. Liugong: Wheeled Loaders Available, 2006

Product Source	Model	Engine		Loading Capacity (Tonnes)	Bucket Size (m ³)
		HP	Manufacturer		
Zhenjiang	CLG816	61	Luoyang	5.3	0.78
	CLG835*	125	Yuchai	10.9	1.5-2.0
	CLG836*	125	Weichai Deutz, Xichai	10.5	1.7
	ZL30E*	125	Yuchai	10.5	1.5-2.0
Liuzhou	CLG842	170	Shanghai Diesel	13.7	2.0-3.0
	ZL40B	170	Shanghai Diesel	13.8	2.0-3.0
	CLG852	218	Shanghai Diesel	16.2	2.7-4.0
	CLG856	218/220	Shanghai Diesel, Dongfeng Cummins	16.8	1.8-4.5
	ZL50C	220	Weichai	16.5	1.8-4.5
	ZL50CX	215	Weichai	16.0	1.8-4.5
	ZL50D	215	Weichai	15.8	1.8-4.5
	ZLG50G	220	Weichai	16.8	1.8-4.5
	CLG862	243	Cummins USA	19.2	3.5
	CLG888	314	Cummins USA	28.5	4.5
	CLG899	336	Cummins USA	42.5	5.4

* Also available from Liuzhou

Source: Company Information

Over its long history of production, Liugong has developed more than 300 models of wheeled loaders, including their variants. It leads product development in the domestic industry, and claims to offer better reliability than its peers. As a result, its designs are often copied by other domestic manufacturers, which has resulted in a group of 'Liugong family products'.

The current range of wheeled loaders covers 15 key models from 60 to 336 horsepower, or from 5.3 to 42.5 tonnes rated loading capacity. Liuzhou is the principal production base, but most of the under 150 horsepower products are being produced in Zhenjiang.

In the main factory of Liuzhou there are two production lines: one is for the older 125-220 horsepower models (ZL30, 40 and 50), with a daily capacity of 40-50 units; another is for the more up-to-date G series, and the other newly-developed ZL40 and ZL50 models, with a daily capacity of 20-30 units. The over 220 horsepower models, given their more modest volumes, have a separate production line.

The Zhenjiang factory currently gives over much of its capacity to the production of the 125 horsepower ZL30 models. However, it may gradually shift its priorities to producing other compact equipment in the next two or three years, and it is likely that the production of the ZL30 model will be transferred back to Liuzhou.

Table 10. Liugong: Production of Wheeled Loaders by Horsepower Category, 2001-2005

(Units)

Horsepower	2001	2002	2003	2004	2005
Under 80	124	132	236	227	69
125	795	1,573	2,436	3,548	4,474
170	873	1,128	1,043	1,089	959
215-220	2,196	5,014	8,320	10,618	11,649
Over 220	-	-	5	10	50
Total	3,988	7,847	12,040	15,492	17,201
% Change	+41	+97	+53	+29	+11

Source: Off-Highway Research

Liugong has been an industry leader ever since it began to produce wheeled loaders. In recent years its production has grown rapidly, reaching 17,201 units in 2005. In the period 2001-2005, domestic sales rose from 3,772 to 15,894 units, during which time its market share has improved from 11 to 15 per cent, and it is now market leader.

As shown in the 2005 data, Liugong's performance is comparatively modest in the compact range under 80 horsepower, and the major portion of its sales were in the 125-220 horsepower range. The 3 tonne products at 125 horsepower accounted for 26 per cent of total sales, and took a 13 per cent market share. The 170 horsepower models, despite their modest volumes, took a 31 per cent share of the domestic market. Liugong was market leader in both of these size classes. The 5 tonne products in the 215-220 horsepower class represent the most important

sector both to the industry and the company, and in 2005 accounted for 68 per cent of Liugong's total sales; in this category Liugong was ranked third place in the industry.

Table 11. Liugong: Sales of Wheeled Loaders by Horsepower Category, 2001-2005

(Units)

Horsepower	2001	2002	2003	2004	2005
Under 80	118	29	190	250	45
125	745	1,444	2,283	3,391	4,140
170	849	1,104	1,056	1,060	849
215-220	2,060	4,521	7,508	9,998	10,936
Over 220	-	-	1	7	14
Total	3,772	7,098	11,038	14,706	15,984
% Market Share	11	13	13	14	15

Source: Off-Highway Research

Liugong offers three larger models in the 243-336 horsepower classes. They combined to represent very modest volumes indeed, with only 14 sales 2005, but this represented significant progress on previous years.

Liugong's plan for 2006 is to achieve 18,000 wheeled loader sales, an increase of 12 per cent over 2005, and to produce 100,000 units in the next five years.

Crawler Excavators

Liugong's first excavator was produced in 1992, when it developed the 40 tonne WY40 model in conjunction with the Tianjin Construction Machinery Research Institute. However, this product proved to be inadequate for the market, and was soon dropped.

In 1995 Liugong resumed the development of crawler excavators, and started with the 20 tonne WY20 model, reflecting the overwhelming preference for this size of machine at that time. A prototype was launched in 1996, and was the forerunner of the machine range that is being produced today. Since 2001 Liugong has been increasing its investment into the sector: in March 2001, an excavator branch company was formed and production was transferred from the main factory in Liuzhou to the current production base nearby in Labao Town, and technical staff were allocated to the excavator research division from other product sectors. In 2002 it began to replace the old WY models with the current CLG series, which represented a significant upgrade in reliability and performance.

Table 12. Liugong: Crawler Excavators Available, 2006

Product Source	Model	Engine		Operating Weight (Tonnes)	Bucket Size (m ³)
		HP	Manufacturer		
Liuzhou	CLG906	56	Cummins USA	7.0	0.09-0.36
	CLG907	57	Cummins USA	7.0	0.09-0.36
	CLG908	57	Cummins USA	7.8	0.09-0.36
	CLG200	147	Cummins USA	19.8	0.73-0.95
	CLG200-3	147	Cummins USA	19.8	0.73-0.95
	CLG920C	147	Cummins USA	20.5	0.73-0.95
	CLG210	147	Cummins USA	20.7	0.91
	CLG210LC	147	Cummins USA	20.7	0.91
	CLG220	147	Cummins USA	20.7	0.73-1.0
	CLG220-3	147	Cummins USA	20.7	0.73-1.0
	CLG922LC	147	Cummins USA	21.0	0.73-1.0
	CLG230	170	Cummins USA	22.5	0.73-1.1
	CLG923C	170	Cummins USA	22.9	0.73-1.1
	CLG250LC	170	Cummins USA	23.3	0.73-1.2

Source: Company Information

In January 2006 **Liuzhou Liugong Excavator Co. Ltd** was founded, and replaced the former branch company. It now offers 14 crawler models, ranging from 7.0-23.3 tonnes.

Table 13. Liugong: Production of Crawler Excavators by Operating Weight, 2001-2005
(Units)

Operating Weight (Tonnes)	2001	2002	2003	2004	2005
7-8	-	-	5	29	146
19-21	122	140	249	349	660
22-24	-	23	125	176	69
Total	122	163	379	554	875
% Change	-15	+34	+133	+46	+58

Source: Off-Highway Research

In an industry that has historically been dominated by the international manufacturers, Liugong's crawler excavator production programme has progressed very well, and has grown from 122 units in 2001 to 875 units in 2005, when it accounted for four per cent of total domestic output. Production is heavily biased to the 19-21 tonne class, but output of the midi types is seeing significant progress. For 2006, total output is expected to reach 1,500 units.

Table 14. Liugong: Domestic Sales of Crawler Excavators, by Operating Weight, 2001-2005

(Units)

Operating Weight (Tonnes)	2001	2002	2003	2004	2005
7-8	-	-	2	26	97
19-21	65	102	191	290	583
22-24	-	16	66	194	62
Total	65	118	259	510	742
% Market Share	-	1	1	2	3

Source: Off-Highway Research

Sales of Liugong's crawler excavators have expanded rapidly in recent years, with an annual growth rate exceeding 100 per cent in both 2003 and 2004. In 2005 sales peaked at 742 units, an increase of 45 per cent over the previous year. Although its market share was still at the modest level of three per cent, Liugong has now secured a leading position among the local manufacturers.

Of the three weight categories of crawler excavators, its best selling models lie in the 19-21 tonne range, which made up 79 per cent of 2005 sales. Its most successful markets are in those provinces that neighbour Guangxi, as well as in Shandong.

Compaction Equipment

Initially, Liugong made an unsuccessful attempt in developing a range of self-propelled rollers in 1995, but in 2000 it acquired a local factory in Jiangyin, Jiangsu Province and formed **Jiangyin Liugong**. Since then it has made significant expansion into the compaction equipment sector.

Liugong currently offers four types of compaction equipment, and 15 models in total. The static and self-propelled types were developed from the old range that was acquired with the factory; the development of tandem rollers began in 2001 through co-operation with TEREX-Benford, but which came to nothing, and then in 2003 it launched its own 13 tonne model. The PTR is a new product sector for Liugong, with a prototype machine currently under development.

Table 15. Liugong: Compaction Equipment Available, 2006

Product Source	Type	Model	Engine		Operating Weight (Tonnes)
			HP	Manufacturer	
Jiangyin	Static	CLG621	122	Shanghai Diesel	18-21
		CLG624	122	Shanghai Diesel	21-24
		CLG627	122	Shanghai Diesel	27
	Self-Propelled (Mechanical)	CLG614	129	Shanghai Diesel	14
		CLG616	152	Shanghai Diesel	16
		CLG618	174	Shanghai Diesel	18
		CLG618A	152	Yuchai	18
		CLG620	174	Shanghai Diesel	20
		CLG620A	174	Shanghai Diesel	20
		CLG622	174	Shanghai Diesel	22
	Self-Propelled (Hydrostatic)	CLG612H	147	Cummins USA	12
		CLG614H	147	Cummins USA	14
		CLG619	190	Cummins USA	19
	Tandem PTR	CLG613	125	Cummins USA	13
		CLG626	180	Cummins USA	26

Source: Company Information

Table 16. Liugong: Production of Compaction Equipment, by Operating Weight, 2001-2005

(Units)

Type	2001	2002	2003	2004	2005
Static	75	156	142	124	90
Self-Propelled	132	202	431	459	426
Tandem	1	-	-	10	-
Total	208	358	573	593	516
% Change	+54	+72	+60	+3	-13

Source: Off-Highway Research

Production enjoyed a high rate of growth in the period 2001-2003, but has recently slowed significantly in the light of falling domestic demand. Output in 2006 is expected to be in the region of 600 units, 18 per cent of which are for the export markets. The development of hydrostatic self-propelled and tandem rollers is being prioritised, although the introduction of hydrostatic models now suffers from the long lead time of imported hydraulic components.

**Table 17. Liugong: Domestic Sales of Compaction Equipment,
by Operating Weight, 2001-2005**
(Units)

Type	2001	2002	2003	2004	2005
Static	76	133	153	122	79
Self-Propelled	92	196	394	431	370
Tandem	-	-	-	1	4
Total	168	329	547	554	453
% Market Share	3	3	4	5	5

Source: Off-Highway Research

Domestic sales enjoyed continuous growth between 2001 and 2004, with its market share improving to five per cent. In 2005 Liugong saw a fall in sales of 18 per cent to 453 units, largely in line with the decline in the industry as a whole, but retained its market share at five per cent. Deliveries are expected to improve in 2006 after the restructuring of the sales department and by the appointment of specialist product managers in each sales region.

OTHER PRODUCTS

Liugong offers a group of other types of construction equipment, all of which are still relatively small in terms of output, or are at the prototype stage.

Mini Excavators: launched in 2005 and now produced alongside the crawler excavators in Labao, some 20 kilometres from the main plant at Liuzhou. There are now two models at 4.0 and 4.8 tonnes. To be closer to the centre of demand, production will very probably be moved to Jiangsu Liugong, the sister company that has been set up to specialise in compact equipment.

Motor Graders: Liugong used to source these products from Chengdu Dahua and sold 19 units in 2003. However, the cooperation has now been terminated and Liugong has since started to develop its own products. Output reached 60 units in 2005, and current monthly rates of production have been raised to around 10 units, most of which are exported.

Asphalt Finishers: these were developed in 2005, and first sales were achieved in the first half of 2006.

Soil Stabilisers and **Cold Planers:** prototypes were launched in mid-2006.

Skid-steer Loaders and **Backhoe Loaders**: although these products had been originally developed some time ago, they were only launched on the market in 2006, and both of them are now being produced in Jiangsu Liugong. Compared with other locally sourced products, they have relatively high specifications, use imported key components, and are mainly destined for export markets, or for special applications such as the military.

Table 18. Liugong: Other Products Available, 2006

Product Source	Product	Model	Engine		Specification
			HP	Manufacturer	
Liuzhou	Mini Excavators	CLG904	41	Quanchai	Operating Weight: 4.0 tonnes
		CLG905	40	Quanchai	4.8 tonnes
	Motor Graders	CLG416	175	Cummins USA	13.7 tonnes
		CLG418	190	Shanghai Diesel	15.5 tonnes
		CLG420	200	Cummins USA	16.5 tonnes
	Asphalt finishers	CLG509	181	Shanghai Diesel	Working Width: 2.5-9.5 metres
		CLG512	219	Shanghai Diesel	2.5-12.5 metres
	Cold Planers	CLG568	544	Deutz	2.0 metres
	Soil Stabilisers	CLG536	350	Cummins USA	2.1 metres
	Zhenjiang	Skid-Steer Loaders	CLG375	76	Weichai Deutz
CLG380			82	Weichai Deutz	1,100 kilogrammes
				Cummins USA	
Backhoe Loaders		CLG766	95	Deutz	Operating Weight: 7.2 tonnes
	CLG776	95	Perkins	7.7 tonnes	

Source: Company Information

MARKETING AND DISTRIBUTION

Liugong has been refining its distribution network in recent years, because the diversification of its product range has called for the re-organisation of its existing system that had originally been put in place to support the company's wheeled loader interests. Since October 2005, its domestic market distribution has been divided into six regions: Northeast, North, East, Central-South, Southwest and Northwest, under which there are a total of 32 local branches. In each region a senior manager has been appointed, and under him there are different product managers and a service manager that specialise in different products, as well as serving customers.

Table 19. Liugong: Domestic Representative Offices, 2006

Region	Location	Area	Region	Location	Area
North China	Beijing*	Beijing	East China	Nanjing	Jiangsu
	Shijiazhuang	Hebei		Jinan	Shandong
	Taiyuan	Shanxi		Hefei	Anhui
	Zhengzhou	Henan		Shanghai	Shanghai
	Tianjin	Tianjin		Jinhua	Zhejiang
	Tangshan	Hebei		Fuzhou	Fujian
North-West	Xi'an	Shaanxi	Central & South	Wuhan	Hubei
	Lanzhou	Gansu		Changsha	Hunan
	Xining	Qingha		Nanchang	Jiangxi
	Yinchuan	Ningxia		Nanning	Guangxi
	Wulumuqi	Xinjiang		Haikou	Hainan
South-West	Kunming	Yunnan	Zengcheng**	Guangdong	
	Chengdu	Sichuan	North-East	Shenyang	Liaoning
	Chongqing	Chongqing		Baotou	Inner Mongolia
	Guiyang	Guizhou		Harbin	Heilongjiang
	Lhasa	Tibet		Changchun	Jilin

* Beijing Guiliugong Company

** Guangzhou Branch Company

Source: Company Information

All sales are now handled by dealers, of which there are now around 90 nationwide. Approximately 60 per cent of them specialise only in Liugong products, and about 50 per cent provide a full range of Liugong products and spare parts. There are over 360 service centres that undertake maintenance and repair, operations that either belong to Liugong, or are owned by the dealers.

EXPORTS

Over the past five years export sales have shown very strong growth, and in 2004 there was substantial progress in all products. In 2005 exports grew by 203 per cent, with a total of 825 units being shipped overseas. In 2006 export volumes have continued to increase, and are expected to reach 1,420 units, valued at RMB400 million.

Wheeled loaders now play the most important role in the company's export activities. Of the total volumes achieved in 2005, 60 per cent were of the new CLG856 five tonne model. The overseas sales of crawler excavators are principally of the 22-25 tonne category, while exports of compaction equipment focus on hydrostatic self-propelled rollers of around 12-14 tonnes.

Table 20. Liugong: Export Volumes and Revenues, 2001-2006

	2001	2002	2003	2004	2005	2006*
Wheeled Loaders	42	110	135	256	670	1,100
Crawler Excavators	-	5	15	52	105	150
Compaction Equipment	-	-	8	15	40	100
Motor Graders	-	-	-	4	10	70
Total	42	115	158	327	825	1,420
RMB Mns	14.3	35.0	29.8	86.1	261.1	400
% Change	+11	+145	-15	+189	+203	+53

* Forecast

Source: Company Information

The International Business Division is responsible for all export business. In view of the different product requirements and cultural backgrounds, it divides the worldwide market into six regions: the Russian-speaking area, South Asia, Asia-Pacific, Africa and the Middle East, Europe and America, to which different policies are adopted with regards to promotion, manpower input, pricing, and production specifications. Currently, the main export destinations are Africa, South Asia, the Russian-speaking area of Central Asia and Australia, but Western Europe and North America have been designated key priority areas.