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King without a crown

China has become the world's largest manufacturing base for mobile working machines by 2010. Despite the crucial role of know-how intensive technologies, such as fluid power, power transmission and motion control, the country still lacks a strong base of domestic component suppliers in these segments. However, the Chinese government as well as leading machine manufacturers are coming up with strategies to change this situation.

In 2010, China has emerged as the world's largest manufacturing base for construction machines, agricultural machines and industrial trucks in terms of units produced. Due to the sheer size of its economy and the still enormous modernization potential, it can be expected that this change will be permanent. The Middle Kingdom will establish itself on top of global mobile equipment manufacturing in the future.

After having become the world's second largest economy last year, the Chinese economy is facing some serious challenges, however. One of them is the combination of rapidly rising wages with a still high percentage of low value-added jobs. This phenomenon diminishes the cost advantages of the Chinese economy – a major factor behind its spectacular revitalization during the past decades. The government in Beijing took this into account in its 12th Five-Year Plan, which has been published last March. In the document, it declared its goal to increase the number of high value-added jobs dramatically by subsidizing R&D in seven so-called strategic emerging industries over the next five years. Among these sectors are clean-energy vehicles and high-end manufacturing.

Besides the rather general problem of rising production costs, there are the following specific aspects, which force the Chinese mobile equipment industry to move up the value chain:

Despite the size of its mobile equipment industry, the domestic base of fluid power, power transmission and motion control component suppliers is still very weak.

This affects in particular the profitability of the domestic construction machinery industry, where Chinese OEMs still transfer considerable parts of their revenues to foreign suppliers (usually between 30 and 50%, in some cases even up to 70%). Another important aspect in this context is security supply: Due to the strong demand in their domestic markets during the boom before 2008, Western component suppliers served their Chinese clients with delays, which led to production downtimes. After the earthquake in Japan in 2011, several Chinese excavator manufacturers suffered from supply shortages from their Japanese hydraulics suppliers.

The dependency on foreign know-how in the agricultural machinery industry is even higher. Although the two major Chinese tractor manufacturers, Foton and YTO, are slowly catching up, the vast majority of manufacturers are still on a technological level, which is comparable to that of their international competitors during the 1980ies. Regarding this gap and the urgent need for a modernization of the Chinese agricultural sector, the government explicitly welcomes foreign investment in modern agriculture equipment manufacturing in its 12th Five-Year Plan.

Most Chinese industrial truck manufacturers are specialized in low-cost IC counterbalance forklifts, which are largely independent from foreign components. However, the need for higher product differentiation as well as the increasing demand for more reliable and environmental-friendly equipment will force them to innovate.

Considering the specific need for foreign know-how in each of the industries described, we currently see five major strategies, how Chinese manufacturers of mobile working machines are trying to facilitate innovation:

1. In-House development of disruptive innovations

Chinese enterprises have realized the disruptive potential of the global trend towards alternative drive systems. Instead of trying to catch up decades of experience in hydraulics, for example, a whole group of construction machinery manufacturers are developing excavators and loaders with hybrid, respectively electric drive technology (see table "Energy efficiency R&D projects of Chinese construction machinery manufacturers"). Thereby, they are following a completely different approach than their Western competitors, who are still heavily relying on combustion engines and hydraulic systems.

This process is fostered by the Chinese government: The development of an excavator with hybrid drive technology is an explicit goal in the "863 Program", one of the country's major high-tech development programs. Besides creating the game-changing effects for its domestic mobile equipment industry, the government wants to increase the resource-efficiency, as well the environmental friendliness of the machines built in China – important issues for the rapidly modernizing nation of 1.3 billion people.

2. Takeovers of Western competitors and component suppliers

The probably most popular approach of Chinese equipment manufacturers to gain immediate access to decades of technological know-how, (as well as has to corresponding distributive channels), has been the acquisition of Western competitors and component suppliers. Already in 2008, Zoomlion acquired Italian CIFA as a bridgehead to the European market. EP Equipment, one of China's leading manufacturers of electric warehousing equipment, acquired BIGJOE, a US material handling equipment manufacturer in 2009 and established a European subsidiary with TVH in 2010. In March 2011, Liugong acquired Polish earthmoving equipment manufacturer HSW. Just recently, China's largest maker of construction machinery, XCMG announced to take over two European hydraulic parts makers (There are indications that one of them is the German company Fluidtronics, though this has not

been officially confirmed, yet).

3. Establishing R&D centres in early-industrialized countries

Sany is currently building a factory in Germany, which will also have an R&D centre. The intention behind this decision is to be closer to the R&D departments of important component suppliers. XCMG announced to establish an R&D centre in Germany, as well in the near future.

4. Hiring Western workforce

The best example for this approach is Liugong, which has an American vice president for Research & Development and hired a team of Western engineers for the modernization of its forklift range.

5. Foreign direct investment through Sino-Western joint ventures

This has been a successful way for Chinese companies from various industries to modernize during the past. Since major Chinese manufacturers in the sectors of construction machinery and industrial trucks are entering the world market successfully on their own strength, this approach has lost its appeal for them. An exception is the sector of agricultural machines, where FDI is still highly welcome (and needed).

It remains to be seen how quickly these attempts will pay off. Recent developments in other industries (e.g. aerospace, high-speed trains) however show, that the Chinese economy is – guided by the central government – capable to move up the value chain with an astonishing speed and at a considerable scale. Therefore, we expect to see more interesting innovations, as well as a rising number of takeovers of Western companies through Chinese mobile equipment manufacturers, in the future.

Energy efficiency R&D projects of Chinese construction machinery manufacturers

Hunan Sunward	Sunward presented its first hybrid excavator, the SWE230S to the public at Shanghai Bauma 2010.
Jianglu	Presentation of a prototype 22t-hybrid excavator in 2010, support from central government (863 Program) as well as from Hunan province government.
Jonyang	JYL621H hybrid excavator
Liugong	Liugong has several R&D projects considering the application of hybrid technology in excavators and presented the CLG922 hybrid excavator at Bauma Shanghai 2010.
SANY	Already in 2009, Sany presented the SY215C8, China's first hybrid excavator. In 2010, the company introduced the prototype of an electric excavator (SY75C3EH).
Shandong Lingong	The company works in close collaboration with its majority shareholder Volvo for an increased efficiency of hydraulic excavators with existing technologies. (Low-Speed engines, energy-efficient torque converter, reoptimized transmission and hydraulic system).
Shantui	Hybrid excavator in development
XCMG	Exhibited a hybrid excavator at Bauma Shanghai 2010
XGMA	Among other machinery, the wheel loader XG955III runs on compressed natural gas (CNG). It is 40% quieter and saves 50% of fuel costs of a comparable diesel excavator.
Zoomlion	Presented the prototype of a hybrid excavator at Bauma Shanghai 2010

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