

# Mechanical engineering 2015 Strategies for a changed world

The mechanical- and plant-engineering industry has weathered shifting business conditions in the last decade: first the growth boom, then the financial crisis in 2008, and now the current economic recovery. It is time to contemplate the changes that have occurred as well as to look ahead to the challenges that will arise in the coming years. The new Oliver Wyman study “Manufacturing 2015” reveals that the factors that lead to success have changed, and contends that business models and management systems must respond in kind to generate future profitable growth.

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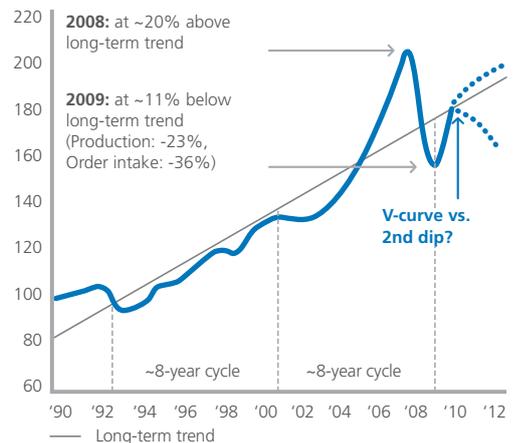
In cooperation with managing directors and board members at leading companies in the mechanical- and plant-engineering industry, Oliver Wyman conducted a study to analyze the factors behind the 2002 to 2008 growth period as well as the course and effect of the crisis. The study also explores structural changes and industry trends expected through 2015. Finally, the study examines what conditions will require company action and how business models and management systems can be modified to be better positioned for future success.

### Crisis accelerates economic shift

From 2002 through 2008, Germany’s mechanical- and plant-engineering industry experienced a boom. At its peak, revenue climbed 20 percent above the long-term trend. Profitability and equity ratios soared to record highs. And German companies successfully expanded their world market share. Only Chinese companies generated stronger growth in this timeframe. But then the financial crisis struck, triggering a precipitous drop in new orders (minus 36 percent) and production volume (minus 23 percent). Even the after-sales business, an area that is presumably immune to economic downturns, plunged by an average of 21 percent. At the same time, prices plummeted by an average of 10 percent. The shift in the regional economic balance of power that was already taking shape – particularly toward China – accelerated considerably. While pro-

duction volume collapsed in the Triad countries (US, Japan, Europe), Brazil, Russia and China generated double-digit growth. Chinese mechanical-engineering companies expanded their global market share to 25 percent. In 2009, their revenue was nearly twice as high as that of German mechanical-engineering companies. The true magnitude of this shift can be clearly seen when these gains are set against the slight edge that Germany still had on China in 2007.

### Production mechanical engineering industry Germany (Index 1990 = 100)



Sources: VDMA, Oliver Wyman analysis, interviews

## The 15 leading Chinese mechanical engineering companies

Rank	Company	Revenue 2009 (bn €)	Revenue CAGR 2004-2009	EBIT-margin in 2009	Product segments
1	Shanghai Electric Group Co. Ltd.	5.8	18%	5%	Electrical Equipment
2	Beijing Jingcheng Machinery El. Hld.	5.0 <sup>1</sup>	n.a.	n.a.	Mech. & el. Equipment
3	Gree Electric Appliances Inc.	4.4	25%	28%	HVAC Equipment
4	Harbin Power Equipment Co. Ltd.	2.9	23%	4%	Power Systems
5	Shanghai Zhenhua Heavy Industry Co.	2.8	31%	5%	Material Handling
6	Techtronic Industries Co. Ltd. (HK)	2.2	8%	4%	Power Tools
7	Changsha Zoomlion Heavy Industry Sc.	2.1	44%	15%	Construction Equipment
8	XCMG Construction Machinery Co. Ltd.	1.9	37%	12%	Construction Equipment
9	China Sinoma Int. Engineering Co.	1.8	47%	n.a.	Cement plants
10	Sany Heavy Industry Co. Ltd.	1.7	44%	17%	Construction Equipment
11	Shenyang Group	1.3	14%	5%	Machine Tools
12	Shanghai Mechanical & Electrical Ind.	1.1	11%	9%	Elevators & Escalators
13	Dalian China Ltd.	1.1 <sup>2</sup>	n.a.	n.a.	Machine Tools
14	Xinjiang Goldwind Science & Tech. Co.	1.1	n.a.	19%	Wind Turbines
15	Guangxi Liugong Machinery Co.	1.1	24%	11%	Construction Equipment

<sup>1</sup> Estimated (state-owned company) <sup>2</sup> End of fiscal year December 2008  
Sources: Thomson Financial, Oliver Wyman analysis

German mechanical-engineering companies successfully responded to crisis-driven drops in their business by taking immediate short-range steps. In terms of costs, they achieved a turnaround by cutting back on temporary employees, shortening workweeks and reducing working capital. As a result, positive EBIT was produced on average during the first half of 2010 – albeit at a considerably lower level than before the crisis. Should the “V-shaped” recovery of incoming orders that is happening

**“Two factors will affect growth in the next two years: success in the race for market share in China and the defense of established domestic markets against the Chinese.”**

in many segments continue, then production volume in 2011 will indeed track the long-range trend line, but it will still be roughly 10 percent below the peak achieved in 2008. Using the 1990s slump as a benchmark, the study does not predict a return to the level of 2008 production volume within short-term.

### Industry trends through 2015

Looking out over the next few years, Oliver Wyman sees several structural changes taking shape. These changes could have a long-term

impact on the management of mechanical- and plant-engineering companies.

### 1. Megatrends alter value-creation structure

Cross-industry megatrends – such as the growing concern about the environment – are having a structure-altering effect on mechanical-engineering companies. Business implications of the Green megatrend, for instance, include the creation of more ecologically-sensitive products and production processes, and the development of new materials and technologies. As a result, the balance among mechanical-engineering companies will shift. Those that act as suppliers for components of the traditional drivetrain in the automotive industry will need to deliver new components for electric motors, or risk being replaced by competitors. Similarly, suppliers that provide components for engine test stands or exhaust systems will also have to reposition themselves.

### 2. Uncertainty necessitates flexibility

In the future, companies must be prepared to face shorter economic cycles characterized by more pronounced ranges of fluctuation. The imbalances in worldwide trade and the economic system, and their accompanying risks and swings, remain high. The accuracy of macro-economic forecasts has been very poor in recent years, which means that companies lack reliable guides. Companies should recalibrate their planning systems to address this issue. Sensible approaches include supple-

menting “base cases” with alternative scenarios that consider upward and downward trends, replacing yearly planning with a rolling forecast system and expanding risk management. Companies should give their cost structures more flexibility by, for example, introducing more variable work-schedule models and outsourcing administrative functions. Finally, the supply chain and the working relationship with suppliers should be based on the “pull principle” to enable them to respond appropriately to fluctuations in demand and to keep inventories structurally low.

### 3. Customer needs become more heterogeneous

Traditionally, many companies targeted the customers of the Triad markets for their products. These markets make up 60 percent to 80 percent of the world market. Now, strong growth generated by emerging countries requires a rethinking of strategies in many segments. In developing economies, customers generally want more simplified equipment with a lower degree of automation sold at a significantly lower price. A mid-market segment is growing rapidly. Suppliers from industrial countries must develop products designed specifically for local needs and produce them in low-cost countries in order to be competitive. In many instances, research and development resources will need to have a local presence. And it certainly will mean sourcing and production in low-cost locations that are integrated into the company’s worldwide know-how pool.

In highly developed markets, by contrast, consumer preferences have shifted from individual pieces of equipment to total solutions. The

**“We must understand the needs of our customers better than the customers themselves.”**  
*CEO of a component manufacturer*

focus is no longer on optimizing an individual item of manufacturing equipment. Rather, the key concerns are now achieving overall efficiency of production, increasing flexibility, integrating processes and, finally, establishing an innovation partnership with the manufacturer that is as exclusive as possible. For mechanical- and plant-engineering companies, this change creates opportunities for additional competitive advantages, further customer-loyalty solutions and new pricing models. In many cases, the increasing heterogeneity of customer needs will require the company to devise multiple business models.

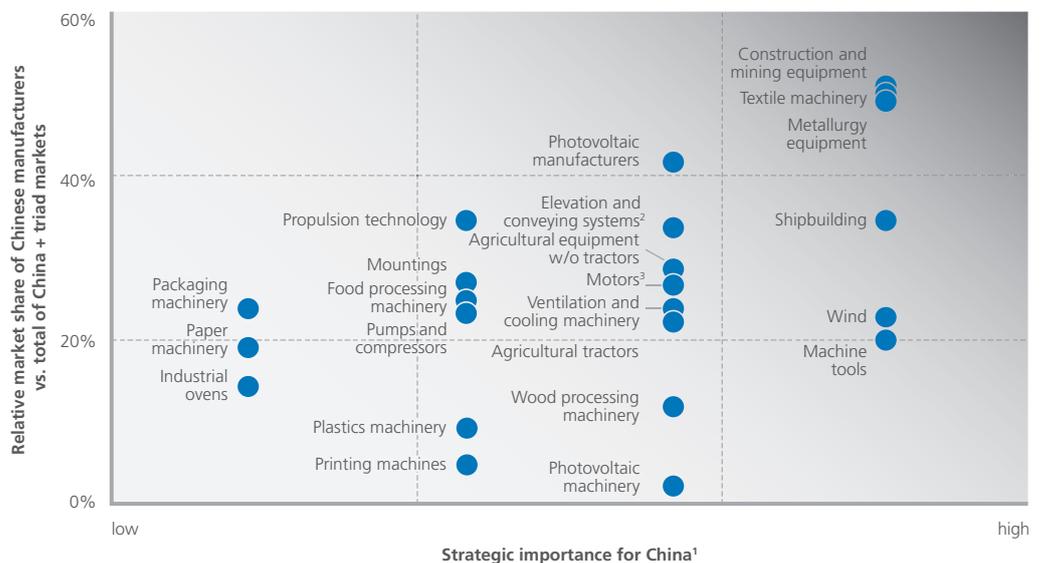
### 4. Competition for growth markets in emerging countries

Industrial production in the Triad countries will show no growth between 2008 and 2013. During the same period, industrial production in China will expand by 64 percent, in India by 53 percent, in Brazil by 23 percent and in Russia by 13 percent. For this reason, the markets for machinery and plants will shift toward emerging countries. In the process, China will be the primary growth engine, expanding its worldwide gross domestic product share to 12 percent by 2015 from 8 percent now.

The shift in demand will be accompanied by intense competition. In strategically critical sectors, China has developed national cham-

## Heat map of competition with China

Market share and strategic importance of selected segments



<sup>1</sup>Importance according to 11th 5-year plan <sup>2</sup>Incl. Escalators <sup>3</sup>Without plane, vehicle and Otto-engines  
 Sources: VDMA, Chinese government communication, Oliver Wyman analysis

pions that produce several billion euros in annual revenue, grow by 20 percent to 40 percent a year and generally have double-digit EBIT margins. Until now, these companies have primarily conducted business in their home market of China. But it can be expected that they will increase their exports in the future. The new Chinese five-year plan places increased emphasis on domestic demand as well as on consumer goods and services and will free up exporting capacities. As was the case with Japanese mechanical-engineering companies in the 1980s, Chinese companies will initially target emerging countries as export markets. As a result, the competition in segments into which Chinese companies are increasingly entering on the world market will intensify in coming years. The degree of the threat will differ widely based on the position and strategic importance of these segments for Chinese industrial policies.

#### Recalibration of the business model

To determine the extent of the threat and, thus, the need to modify the business model, companies should examine three points:

- **Exposure:** Is the segment where the company does business a focus of Chinese industrial policies? Will the country's new five-year plan change this? How large is China's share of the world market? Where will leading Chinese providers be in three to five years? In general, how threatened is the segment in which the company does business?
- **Differentiation:** Is long-range differentiation possible? Can a current differentiated position be strategically controlled through proprietary components, virtually irreplaceable process know-how or other steps? Does the company have a defensible position in an endangered segment?
- **Withdrawal options:** Are there (customer) segments to which a company can withdraw even if it will lose in the volume market of emerging countries? Is the market so homogeneous or are the customers so global that a withdrawal into a niche is not an option?

A small, financially strong hidden champion that is active in a high-end niche and has few global customers must make relatively few changes in its business-location structure and

management model; it only has to tailor its differentiated product range to meet customer needs. A technology partnership or targeted acquisitions could be issues worth considering.

But the shift in demand may have a greater impact on larger companies offering products that are hardly distinguishable from their competitors' in volume markets. These companies will be on the radar screens of Chinese companies. To achieve growth, product lines, cost and business-location structures as well as management models must be adapted to the new demand conditions. The extent and variance of the necessary product range and after-sales coverage are just two aspects that illustrate the extent of this challenge.

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#### Four strategic action areas for profitable growth

##### Management of uncertainty

- Increased flexibility of the supply chain and cost basis
- Rolling scenario planning
- Risk management

##### Product innovation

- BRIC: Focus on costs in order to be competitive in the mid-market segment
- Triad: Focus on solutions that improve customer efficiency

##### Strategic cost cutting

- Product-cost cutting
- Globalization of the supply chain
- Lean and global processes throughout the company

##### Recalibration of the business model

- The need to make changes depends on the competitive position against Chinese players, differentiation potential and the customer base
  - Alliances and consolidation
  - Changes of global organization and leadership model
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