



Industry Forum

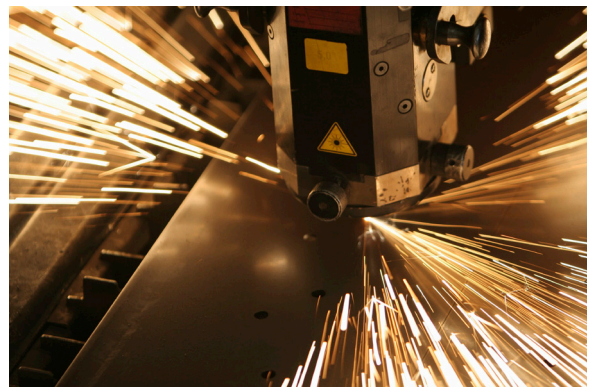
Business Excellence Through Inspired People

July 2013

# Global Developments in Advanced Manufacturing

The US manufacturing sector benefits from their nation's global strategic goal to remain the most powerful country in the world militarily. This requires a large innovative manufacturing sector and the Department of Defence is a major spender on industrial and technical R&D. Federal decisions need to be based on good analysis and the Institute for Defence Analyses operates three federally funded research centres to examine the scientific and technical aspects of national security issues. Just over a year ago the Institute published a major investigation into Emerging Global Trends in Advanced Manufacturing. The report identified 5 overarching trends supporting the development of advanced manufacturing globally:

- 1) the ubiquitous role of information technology
- 2) the reliance on modelling and simulation in the manufacturing process
- 3) the acceleration of innovation in global supply-chain management
- 4) the move toward rapid changeability of manufacturing in response to customer needs and external impediments
- 5) the acceptance and support of sustainable manufacturing



The report concluded that in particular countries, the development of advanced manufacturing depends on some factors that a country's government can influence, such as infrastructure quality, labour skills and a stable business environment. On the other hand, the size of the market and growth potential are the primary reasons why companies choose to locate in a particular country or countries.

Just over eighteen months ago, another US think-tank, the Third Way, published a report entitled Manufacturing Growth: Advanced Manufacturing and the Future of the American Economy. The authors, Devon Swezey and Ryan McGonachy, concluded:

*Advanced manufacturing is critical for the future prosperity of the U.S. economy. Not only does it have the potential to generate and sustain many jobs throughout the economy, but it is a key source of innovation, productivity gains, and exports. A robust advanced manufacturing sector is also a prerequisite for developing new technologies that will form the basis for tomorrow's innovative growth industries.*

An important context to this conclusion is the fact that at the start of this decade China became the country with the largest manufacturing sector in the world, in terms of value added, overtaking the US. Inevitably this has focused the US policy discussion and think-tanks like McKinsey have been investigating the likely future manufacturing trajectory of China.

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Earlier this year McKinsey published a study that concluded as value chains become more complex, and consumers grow more sophisticated and demanding, China's manufacturing must adapt significantly. Currently manufacturing growth in China is slowing more quickly than aggregate economic growth. The June 2013 manufacturers' purchase managers' index fell to 50.1 (in the UK it rose to 52.5). McKinsey have identified 4 factors which challenge China's manufacturing growth.



1. Rising factor costs particularly labour costs.

2. Rising consumer sophistication: McKinsey research suggests that by 2020, the income of more than half of China's urban households will have moved into the upper middle class. The members of this group already demand innovative products that require engineering and manufacturing capabilities many local producers do not yet adequately possess. This challenge confronts many sectors - appliances, chemical, electrical and office machinery, pharmaceuticals, telecommunications gear, and transportation equipment – sectors which compete on the strength of their R&D, technology, and ability to bring customers a steady stream of new products and services.

3. Rising value-chain complexity: Greater affluence and rapid urbanization requires product makers to manage, make, and deliver an array of increasingly diverse and customized products to increasingly remote locations. Between now and 2015 almost two-thirds of the growth in demand for fast-moving consumer goods in China will come from smaller

cities, which outnumber their major counterparts, such as Beijing or Shanghai, by a factor of 20. Product proliferation and booming e-commerce also contribute to value-chain complexity.

4. Heightened volatility: The uncertain global economic environment since 2008 has complicated Chinese manufacturers' environment substantially. Volatility makes planning difficult for China's manufacturers especially those that routinely make large, long-lived capital expenditures whose returns are crucial determinants of performance.

McKinsey suggest that the best response to these challenges for Chinese manufacturers is development across their organisations. For example, significant potential remains in the application of Lean and Six Sigma. Plant managers in China often focus on "hard" technical tools at the expense of "softer" ones involving mind-sets and behaviour. For example, a recent lean-manufacturing transformation at one state-owned enterprise fell far short of its efficiency targets when managers and supervisors failed to complement the otherwise excellent technical changes with the necessary softer skills - including leadership.

Product-development roadblocks need to be overcome. Accelerated product development with time compression and concurrent engineering have long been the desired norm in advanced countries and Chinese manufacturers must acquire these demanding capabilities to service the fastest growing segments of their consumer and related markets.

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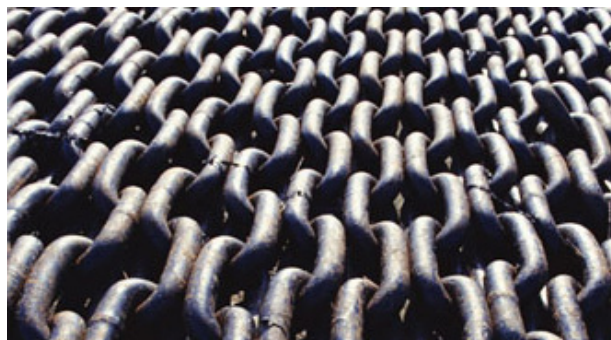


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Most Chinese consumers are changing faster than supply chains are adapting. As companies look to move their footprints closer to customers in Tier-three and Tier-four cities in China's interior, a likely change will be the long-term development of logistics hubs and assets so that they are better positioned to serve booming demand for online purchases. However, these investments are risky. Chinese companies with global plans must get also closer to customers in the West. There are reports that a few of the largest white-goods makers are thinking about expanding their assembly and test activities in the developed world, because they recognise that they can no longer adequately serve it from existing Chinese manufacturing hubs.



We noted in an earlier article that the National Advanced Manufacturing Competency Framework developed by the US proposed very high levels of skill for employees throughout manufacturing organisations including high levels of soft skills achievement. Indeed, the US vision of advanced manufacturing is soft-skills intensive. This approach makes clear strategic sense in view of the difficulties that Chinese manufacturers have encountered working with simpler models of operational excellence.

It is sometimes forgotten that Japan remains the third largest manufacturing country in the world after China and the US and ahead of Germany. In terms of manufacturing value added per capita, Japan is second only to Switzerland, ahead of the US, Germany and Singapore. Japanese manufacturing has maintained this position despite the rapid growth of nearby Chinese manufacturing. Understandably, manufacturing in Japan today has developed to focus primarily on high-tech and precision goods. Part of the Japanese model is extensive global FDI illustrated by the recent Hitachi decisions to establish railway engineering in the UK and to bid for a new nuclear power generation contract at two sites in the UK.

Japan is taking action at national level to maintain its global manufacturing position and accelerate growth in new advanced manufacturing sectors. In 2010, the government approved an economic growth strategy re-released in July 2012, called the "Rebirth Strategy for Japan", which lays out social and economic goals for 2020. This strategy seeks to leverage Japan's strengths in manufacturing and technology, to deliver US\$ 1.3 trillion in new industries and 4.7 million jobs by 2020.

It is important to tease out the implications of the vision of advanced manufacturing that is under consideration here. The value dynamic starts with the consumer and her or his appetite for complex new goods and services which are customised to their particular tastes and quite possibly investigated and ordered while he or she is on the move. In the UK part of this dynamic has been explored by the Institute of Manufacturing in Cambridge for several years and latterly by Aston University in Birmingham. Aston have just issued a new report which finds manufacturers that incorporate useful services with their existing products are realising business growth of 5 to 10 per cent a year. The study explains 'servitization', the concept of adding technology-led services to manufacturing, and its potential to represent 50 per cent of a company's revenues.

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Aston's 'Servitization Impact Study' finds that servitization also reduces costs of up to 30 per cent for manufacturing customers by helping them to simplify business operations and streamline labour-intensive processes. Manufacturing and service are still largely thought of as separate, self-contained sectors. Aston sees that a huge opportunity exists to promote more manufacturers to compete through services. Professor Tim Baines, Operations Strategy, at Aston University said; "The distinctions drawn between manufacturing and services are artificial and unhelpful, when in truth the two are already coming together in a way that is re-shaping the future of U.K. manufacturing."

"Our work with Aston University and Professor Baines in recent years has revealed huge potential for our economy but it will take a shift in mind-set, organisational structures and operations before the promise of servitization can be truly realised," said Alan Charnley, Managing Director of Xerox U.K. and Ireland, a co-sponsor of the study. He added; "Industrial operation is becoming increasingly sophisticated and services are a huge way to make that innovation count."

The study was launched at the UK Servitization Summit for Industry, hosted by Aston University in May. The value dynamic we have been exploring aligns very well with the benefits of servitization. Within this perspective innovation is driven by better meeting the customer's needs and wants in a manner which suits their lifestyle choices. Manufacturers who develop through servitization are engaging with the opportunity to make better connection with these drivers. This engagement requires a rich skills portfolio - one which combines technical skills with a high level of soft skills.

Throughout the value chain the best standards of operational excellence must be adopted. Industry Forum has experience in depth in working in both manufacturing and services and, particularly in the food sector, in working across the manufacturing/services boundary.

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