



**Materials
Processing
Institute**

CHINA – INDUSTRIAL POLICY AND COMPETITIVE THREATS

A speech delivered on the UK Steel Market Outlook Meeting,
EEF Broadway House, London.

14 April 2016



Introduction to Self and Materials Processing Institute

As you will know I advocate continuous, relentless innovation in the process, the product and customer service as the only sure way to continue to grow a business and be profitable. It is for me the only sustainable approach to business success.

Economic Context in China

I have been travelling to China to for a number of years and in that time have followed the development of the technology and capability of Chinese industry. Progress and pace have been astonishing.

Arriving in Shanghai there are obvious and impressive signs of growth and investment. One of the few airports with a mag-lev train, Shanghai also has a high speed rail connection to the capital and high speed rail is now becoming a major export in its own right. Having developed its own system in record time, China is now building a rail network through Thailand and making a \$9.5bn dollar investment in extending the domestic network to the East before 2019. Contrast that with the agonising in the UK over the second high speed line and it is clear that the knowledge and expertise to pull off these large infrastructure projects is no longer in the west. The reason for this must surely be due to the palpable sense of excitement, optimism, hard work and drive. This outlook, combined with a commitment to technology and the industry to make it happen is the underlying theme that is driving forward Chinese success.

Our usual focus on the technological and economic aspects of the Chinese economy, is though only part of the story. When we turn to the societal and people aspects we can see that it is not all one way traffic for China. With increasing industrialisation and development come some of the social and environmental issues that are also seen in the West. This unprecedented pace of industrialisation is also being rapidly followed by many of the challenges that other developed economies have faced. The global economy is being driven by a series of megatrends, amongst these are a shift of power to the East, increasing urbanisation and an ageing population. The first and second of these are readily apparent in Wuhan, but the population issue is also there and presents serious challenges. China's medical system is effectively available on a pay as you go basis, but with an ageing population and recent studies in the Lancet suggesting one third of young men will die of smoking relating illnesses, the challenge is huge and a huge response is required. This would not be unusual for China, a country capable of massive collective effort.

Global Dynamics

The recent visit of the Chinese President, Xi Jinping, to the UK sparked great interest in China. The clear desire by the UK government to foster close relations with their counterparts in China and encourage inward investment in UK infrastructure projects, encouraged interest in my own visit to China to discuss technology and innovation. My discussions showed a clear desire to invest in innovation for long term industrial sustainability, rather than driving for immediate returns. In this climate my lecture on innovation strategy at Wuhan University of Science and Technology, where I am associate Professor, was well received. The University is one of the leading metallurgical engineering universities in China and has laboratories of national significance in key areas. I lectured to staff and students in the department on the drivers for innovation, the key themes for successful industrial innovation and how this could be applied in practice. In particular we discussed the invention of new measurements, leading to information, then advice and finally process control. Progressing through this hierarchy and overlaying advanced interrogation of the massive repositories of available process data, presents clear opportunities for advancing industrial processes significantly in the coming years.

The audience of staff and students readily grasped the concept that innovation is the core of competitive advantage for manufacturing industry. The relentless improvement of processes, products and customer service is the only way to keep ahead of the competition and in China the competitive environment and will to succeed is readily apparent. To support this, the Chinese government is taking a leading role in establishing industrial parks to nurture the innovation companies of the future that will advance industries in manufacturing sectors, such as aerospace, robotics, ocean engineering and information technology.

It is interesting to speculate what role the UK will play in this transformation of China from an industrial powerhouse, to an innovation powerhouse. China has been following a clear plan in this area for over twenty years and when it comes to business investment, future certainty of policy is a major advantage. The UK does have a phenomenal resource in embedded knowledge, but it is unlikely that this can be sustained without an advanced manufacturing base to develop it further. For this relationship to produce genuine mutual benefit, the UK needs to prioritise sustainable development, with innovation at the core of its strategy, just as much as China needs access to the knowledge and technology that the UK has to offer.

A clear example of this was a conversation I had with a UK ex-pat. One message that came across quite clear was that entrepreneurs from overseas who choose to move to China have a great opportunity to establish highly successful companies in this fast growing, and lightly regulated, market. Whilst a move to China may be too high a barrier for some people, it also helps to protect new businesses in what is effectively a large captive market.

At the time of the visit of the Chinese Prime Minister, it was implied in the media that the so-called 'Golden Era', as this advancement in Sino-Anglo relations is now being called, has not captured the public imagination in China. Whilst this may be the case for the man on the street, in my conversations with industry leaders and academics, a strengthened relationship with Britain is seen as a great opportunity. I don't want to overplay this; let's be frank, China regards the USA as a major benchmark for economic development and the UK can't be regarded as part of that group. However, there is a willingness to participate in collaboration for mutual benefit. Where the UK needs to exercise caution is to ensure that the benefit is mutual and the collaboration is not actually endangering the long term competitive position of UK industry.

Steel Industry

Any discussion of China in relation to the steel industry generally centres on capacity. It is my aim today to give a more qualitative appraisal of the general direction and strategy of the Chinese industry. However, it is worthwhile giving some figures by way of context. The Chinese industry is in the process of enacting capacity reductions on the direction of the government. There is continued investment in large plants, but each of these must be accompanied by elimination of capacity elsewhere. The net effect is to create a smaller, more efficient and consolidated industry. The difficulty with this policy is that there is an estimated 400MT of underutilised capacity in China. A more conservative figure of 300MT was recently reported in the Financial Times, though either way it is somewhat more than the 150MT capacity reduction planned for in the coming years.

The difficulties of reducing steel capacity are well understood and so the Chinese government is approaching this as a national strategic priority. The government regards the steel industry as a servant of the economy. The industry delivered the materials and capacity to allow for rapid economic growth. Now that the economy is maturing and steel demand declining, the rest of the economy, the government and the people have a duty to behave responsibly towards the industry that has served them well and enable it to restructure to become much smaller, retain profitability and resettle the displaced employees.

It was widely reported that the Chinese Minister for Human Resources announced in February that 1.8M jobs would need to go in the coal and steel industries. This is 15% of the total workforce, though no timescale has been given. In March Wuhan Iron and Steel Co (state owned) announced that 40,000 to 50,000 of its 80,000 staff would be laid off.

The level of concern within China, on the societal and internal security implications of mass unemployment cannot be over stated. The Government of China would be rightly concerned about the risks to its own regime from civil unrest, if reductions in the steel industry resulted in mass unemployment in concentrated regions of the country.

The Chinese Government will provide \$15bn over the next two years for labour resettlement and sources inside the country inform us that attention is turning to prioritising the redevelopment of what will become former steel towns. Some of these towns will be completely eradicated and some will be refounded as modern, networked, smart cities, leapfrogging many of the initiatives begun in the UK and elsewhere to regenerate our own urban spaces.

13th Five Year Plan

The reason for dwelling so long on the general political context in China, is because, the strategy and direction of Chinese steel companies is intrinsically linked to the National strategic priorities. As state owned enterprises the steel companies are obliged to issue their response to the 13th five year plan, which was widely trailed in the Autumn, prior to publication. The plan sets out the progression of China from its current high growth, manufacturing led economy, to a more diverse and mature economy.

To understand the consequences of the plan on players within the steel industry in China it is useful to reflect back on a lecture given at the bi-annual UK Steel Forum, held in the Autumn here in London and in particular a talk given by the head of World Steel, Edwin Basson. For those not present at that time, Basson placed the current capacity crisis in the steel industry in the context of two previous occasions. The last occasion was in the late 1970s when a combination of the oil price shock and a fall off in demand arising from the end of the post-war infrastructure boom in Europe, led to a global realignment and reduction in capacity.

Basson outlined the effect on the industry at that time and the different approaches taken in North America, Europe and Japan, to consolidate and align capacity. It was Basson's conclusion that the approach taken in Japan was the most successful, resulting as it did from a close co-operation between the players in the industry, strong links with national government priorities and investment in new technology. Most particularly the approach in Japan at that time was to place research and innovation front and centre in the industrial restructuring, with investment in large coastal sites, enabling Japan to assume a position of technology dominance in the industry. It was Basson's assertion that this would be the approach to be taken in China.

Basson was, I believe, partly right, the 'one belt one road, policy, already underway, is resulting in the creation of these large coastal sites. However, I believe that the implications of the 13th five year plan are far more wide reaching than a reproduction of the history of European and Japanese steel industry development from the 1970s.

We have become accustomed, however astonishing, to a situation where economic growth in China has outpaced all expectation. In a period of ten years, China underwent a century of growth and development. With the publication of the 13th five year plan, we have reached the point where China is no longer catching up with other advanced economies, it is about to surge ahead. To be specific, I am not talking about China surging ahead in sheer economic size, or growth rate, I am talking about China surging ahead in defining and developing the industries that will form the future of the global economy.

Gone are the days when we can rely on first mover advantage in industrialisation to keep our nose out in front. We are no longer in the position of watching China develop at pace, but along a path well trodden by others. We can no longer account for the rapid growth rates, by pointing out that China already knows the direction of travel, because others have been there before. As of 2016, we are now in a direct competition with China to carry out the research, innovation and technology exploitation, that will develop the products, processes and industries of the future and China is able to do this without the legacy infrastructure and costly, if necessary, regulation, that slows our ability to react and increases our costs.

So right now China is in the process of implementing its 13th five year plan and the obligations for state owned enterprises, and therefore a good chunk of the economy, are enshrined in this policy. Company strategies are now being aligned to the plan. This means a greater emphasis on innovation, the environment and the development of an advanced industrial base, incorporating manufacturing led customer services and the integration of manufacturing with information technology. Breaking down the information technology aspects further, development of the internet of things and developing applications of big data are core enabling activities.

For me, as an innovation specialist leading a research institute, this presents great opportunity for marketing our services to Chinese companies and we can help our customers to do this as well. I attended the Shanghai Metallurgy Expo last year and saw an impressive array of technology and manufacturing capability from Chinese companies, but there are still plenty of opportunities for manufacturing exports to China. Even in the steel sector, China has a great appetite for imports of highly specialised steel products in advanced manufacturing markets that are critical to the future development of the economy.

So much for the good news. It is worth reflecting that China's latest five year plan would not be dissimilar to the kind of industrial strategy the UK needs, if we were to articulate how we will achieve our aims of rebalancing the economy and developing capability in advanced manufacturing. The recently established Crick Institute in London will focus on big data. The Sir Henry Royce centre in Manchester, announced last year, will undertake similar activity to the 15 innovation centres that China intends to establish for the steel industry alone. Whilst there are opportunities for UK companies to sell into China, it will only be on the back of being world leading in our processes, our products and our customer service. In other words, the only sure way to continue to be competitive is to continue to invest heavily in innovation. By the time of the next five year plan, Chinese strategy will be breaking ground that we have not yet considered.

It can be seen how, for the State directed steel companies, this policy is having an immediate impact on company strategy. By way of a specific example, BaoSteel, probably the most innovative steel company in China, is centring its entire company strategy around what it terms 'internet plus'. Internet plus is an initiative that aims to place digital innovation in all aspects of the process, product and service offering of the businesses. Whilst many of the details are yet to be scoped out, a new digital sales platform incorporating competitor products and plant automation akin to Industry4.0, the European initiative arising from Germany, seem to be early favourites. These initiatives and the others that will come alongside them are how China is tackling head on the next phase of industrialisation. A drive to advanced manufacturing, with fully integrated internet based data management, will allow the country to leverage its manufacturing strength to create enhanced service and knowledge based industries. If this is successful China will leapfrog the painful period of industrial decline experienced particularly in the UK and move direct to a fully advanced economy at the leading edge of development.

All this could be achieved, not in the almost 300 years it took Britain, but in 30 years of rapid growth. Before the industrial revolution China was the largest and arguably the most technologically advanced civilisation on Earth. After what is, in terms Chinese history, a small period of time, China looks set to regain this position.

UK Steel Response

In the face of this overwhelming effort of a planning, strategic direction, control and success, it could be easy to fall into the trap of assuming that there is little space for a competitive UK Steel industry, but this would be to ignore not only what we do well, but what is happening around us right now. Where the UK specifically has an advantage over China is our ability to move and adapt quickly, to attract private capital, to let failing organisations fail and new ones appear. Our diversity and internationalisation, our access to demanding customers, across a single large, single European market. All of these are strengths that can help to keep the UK industry fit, agile and above all profitable.

I have spoken about the extensive support for industrial innovation now in place for the steel industry in China. In contrast with other parts of UK manufacturing, innovation in the UK steel sector is largely privately funded, but there is an opportunity now to change that.

We heard this week about the willingness of Government to consider co-investment in the steel industry to secure a long term sustainable future. Many of you will know that for some months now we have been in discussion with Government about the creation of a new Catapult, the name given to Government initiatives to support industrial innovation. Our proposal is for a Materials Catapult, which would benefit the steel and other materials industries. In the Steel debate in the House of Commons on Tuesday, the Secretary of State acknowledged that a Catapult could be an example of such co-investment and that he would be prepared to consider the proposal. We are now following this up directly with officials and Ministers and I am grateful for the ongoing support of so many of you in this room in highlighting the urgent need for the Materials Catapult to Government.

Conclusion

In conclusion then, the Chinese steel industry is and will remain the big beasts in the global steel ecosystem, but just as in the natural world, big beasts struggle to cope, with fast moving, smaller, operators and the UK has the opportunity now to transition to just that kind of steel manufacturing economy. However, this can only happen with the right kind of support. It is by the co-investment of the UK steel industry and UK Government, in UK innovation that we will continue to hold this place as the fast moving, opportunists of the steel world.

Chris McDonald is the Chief Executive Officer of the Materials Processing Institute. The Institute carries out industrial research and innovation in advanced materials, low carbon energy and the circular economy. Chris's background is in industrial research and manufacturing, where he has worked internationally. He led the divestment and return to independent, not-for-profit ownership of the Institute in 2014, the year the organisation celebrated its 70th anniversary.

In addition to leading the Institute, Chris provides expert consultancy support to companies, Governments and public bodies, in technology strategy and the technical due diligence aspects of mergers and acquisitions. He is prominent in the development of public policy, around innovation, steel and SMEs, where he works to support growth and inward investment. He is the policy chair for Innovation and Enterprise for the Federation of Small Businesses, a member of the CBI Regional Council for the North East and is the Innovation Lead for the UK Metals Council. Chris is also a member of the Steel Advisory Board for UK Steel (EEF).

A graduate of Cambridge University, Chris is a Fellow the Institute of Chemical Engineers and of the Institute of Materials, Minerals and Mining. He sits on industrial advisory boards at a number of universities, including Oxford and Sheffield.

He is often called to commentate in the media on innovation leadership and the steel industry.

Chris McDonald
Chief Executive Officer
Materials Processing Institute

“Chris provides expert consultancy support to companies, Governments and public bodies in materials, technology and innovation strategy”



Materials Processing Institute

The Materials Processing Institute is an independent, open access and not-for-profit technology and innovation centre working with industry, government and academia worldwide. Support ranges from small scale, site based investigations, through to long term collaborative research programmes.

The Materials Processing Institute is expert in advanced materials, low carbon energy and the circular economy, specialising in challenging processes, particularly those involving high specification materials, high temperatures and difficult operating conditions.

The Institute has over 70 years' experience as a leading UK technology provider. Extensive materials processing knowledge is supported by state-of-the-art facilities with a broad range of equipment, from laboratories through to demonstration, scale-up and production plant.

Scientists and engineers work with industry and apply their expertise to develop and implement robust solutions to research and development and improvements for products and processes.

Expertise is spread across a wide range of disciplines, including:

- > Materials Characterisation, Research and Development
- > Simulation and Design
- > Monitoring, Measurement and Control in Hostile Environments
- > Process Development and Upscaling
- > Specialist Melting and Steel / Alloy Production
- > Engineering / Asset Management
- > Materials Handling
- > Minerals and Ores

Research and project management teams deliver support across a wide range of industrial and manufacturing sectors including:

- > Metals and Metals Manufacture
- > Chemicals and Process
- > Nuclear
- > Oil & Gas
- > Energy
- > Aerospace and Defence
- > Mining and Quarrying



**Materials
Processing
Institute**

Materials Processing Institute
Eston Road
Middlesbrough
TS6 6US
United Kingdom

+44 (0)1642 382000
enquiries@mpiuk.com
www.mpiuk.com

