



Steel Ourselves for Change

Amid the turmoil facing UK steel there is a huge opportunity

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EVERYTHING in the world is either made from steel, or with steel. As a material, steel has transformed human life, remains essential for economic growth and helps to raise the living standards of people across the world. No other materials can be made in sufficient quantity, or have the same versatility as steel. In the UK, steel production remains as vital as ever and yet the risk of the wholesale collapse of the UK Steel industry has been increasing for many months. The industry is beset by the twin problems of steel from China being sold at below the cost of production and the lack of a level playing field on energy in Europe.

In the rest of UK industry, strong growth is forecast for

automotive; a series of large-scale national infrastructure projects in transport and energy have been announced; and the aerospace industry is world leading. These industries and projects require competitive and innovative advanced materials. A domestic steel industry is essential to provide this. Innovation in manufacturing relies on innovation in steel, sometimes with the end user, but often in the supply chain. Without the foundation of the steel industry, first the supply chain and then the large manufacturers would see a gradual erosion in their competitive position. Put simply, the UK cannot have a high value manufacturing sector without a steel industry, but the industry is not a public service, it must thrive on its own terms to be both profitable and sustainable.

SUPPLY AND DEMANDS

The industry trade body, UK Steel, has made five asks of government that would level the playing field in Europe, particularly with regard to energy, and to address the dumping of subsidised steel from China in the UK. However, the shakeout in the UK steel industry goes far beyond these requests. As a consequence of the current trading conditions, there is a once-in-a-generation opportunity for a complete realignment of the industry, leading to new forms of ownership, new business models and new technologies.

Many of the fundamentals for the UK are already in place: our manufacturing industry demands the continual development of new advanced steels; our university sector is world leading in new steel development; and my own organisation, the Materials Processing Institute (MPI), has a 70-year history in delivering cutting-edge process technology for the most efficient manufacture of the materials of today and the future. What is needed is a step change in the fundamental business model, enabled by a switch to different manufacturing technology.

Much of the discussion in recent weeks has been about the relative merits of blast furnace steelmaking, as opposed to electric arc furnace (EAF) steelmaking. The dominant steel manufacturing process is the blast furnace route, where iron ore is reduced by coke. This produces liquid iron that is saturated with carbon and is processed in a second stage, the oxygen furnace, where the carbon is removed by supersonic injection of oxygen. The liquid steel resulting from this process is then further refined and alloyed to achieve the desired properties for the particular steel product being produced. A proportion of steels are also produced via the EAF route, where, usually, 100% steel scrap is melted using electricity. Traditionally, this route was reserved for smaller-scale operations and a limited range of steels.

Over time the blast furnace steelmaking route proved to be hugely successful, with British Steel achieving a 500% increase in productivity in the four decades since the current crop of UK steelmaking facilities were commissioned. Continuous, relentless innovation has transformed these production operations, with much world-leading technology being developed here in the UK at MPI. However, increasingly, steel producers have struggled to recover the cost of capital, or to build in the operational flexibility needed to satisfy market demand. At the same time, over this period, the scale, quality and flexibility of EAF steelmaking has been gradually increasing. This, combined with much lower capital costs, has narrowed the differentiator available to the existing production facilities, creating precisely the conditions where an external shock can lead to a step change in the method of manufacture.

Another factor favouring EAF steelmaking is the availability of raw materials. Blast furnaces require iron ore and coal, which was advantageous when the UK had access to indigenous materials. It was the opportunity presented by the availability of these raw materials that drove the location and

development of the steel industry in the UK. As the suitability of these materials declined, the UK industry, as with most of the rest of the developed world, coalesced around large coastal sites with access to deepwater ports, for ease of importing raw material.

Forty years on, the UK is once again presented with a unique raw materials opportunity. Having been the first nation to industrialise, the UK has a mature infrastructure and this leads to the generation of an estimated 10m t of scrap steel annually. Approximately 6m–7m t of this valuable raw material are exported every year for processing and then a similar amount is imported back into the UK as steel products. The UK has a large market for steel that is forecast to grow, access to raw material that is currently exported, and the intellectual capital in our workforce, universities and MPI. Switching the processing technology to EAF, at a relatively low cost, will give a step change reduction in CO₂ emissions, improve operational flexibility, and meet future customer requirements for quality and service.

THE OPPORTUNITY TO MAKE THIS TECHNOLOGICAL SHIFT REPRESENTS THE CUSP OF A PARADIGM SHIFT IN UK STEEL MANUFACTURE THAT COULD GIVE THE UK THE OPPORTUNITY TO EMERGE AS THE MOST ADVANCED AND COMPETITIVE STEEL-PRODUCING NATION IN THE WORLD

The opportunity to make this technological shift represents the cusp of a paradigm shift in UK steel manufacture that could give the UK the opportunity to emerge as the most advanced and competitive steel-producing nation in the world. At the MPI we have recognised the potential for this opportunity and are discussing a specific proposal with government to create a new Materials Catapult, to enable the industry to develop and implement the technologies needed to make this leap forward. The UK's strategic innovation infrastructure is known as "Catapult". The steel industry, and the materials sector more widely, are not currently supported by the existing Catapult network, and our proposal has received widespread support from industry, academia and professional institutions. The Materials Catapult would use the existing facilities of TWI, IOM3 and our own Institute to accelerate innovation and research commercialisation in the UK materials industries.

To be clear, the steel industry, essential as it is to our economy, cannot recover unless the issues of steel dumping and energy prices are addressed by both government and the EU. However, with this in place, the UK industry can be the global leader in making this step change in technology. This will result in the flexible, profitable and advanced steel-making capability that the UK needs, to enable growth in the advanced manufacturing sector and to continue to support the improvement in our standards of living that has been the unique contribution of steel since its inception. ■