Cinnober’s Veronica Augustsson talks technology

Non-ferrous innovations

Digital revolution in trading and industry
The Middle East Steel Industry: A Strategic Market Outlook to 2021

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Digital decisions

For many people, digital technology has become an essential part of everyday life — the mobile phone, tablet PC, laptop and sat-nav taken for granted as essential tools that have become integral to their daily activities at work or leisure. Similarly, in the industrial world, electrical and automation systems have become an essential and integral part of production machinery.

In the steel and metals industries, control pulsits for mining equipment, smelters and refineries, meltshops, casters, mills and processing lines have come to resemble rooms that at one time might have only been associated with space missions.

So what’s new? The simple answer is that the ability to collect, organise, store, analyse and use the vast amount of data that equipment generates has come of age through advances in sensor and communication technology and computer processing power. The huge pool of data, an ability to remotely monitor and control equipment via the internet, on tablets or mobile phones if desired, the increasing ability to allow industrial plants to ‘learn’ from their own performance — ‘big data’, if desired, the increasing ability to allow industrial plants to ‘learn’ from their own performance — ‘big data’, the ‘Internet of Things’ and ‘smart factories’, respectively

The ability to collect, organise, store, analyse and use the vast amount of data that equipment generates has come of age'

The combined July-August issue of MB Magazine has a focus on all of the above. It is clear that the scope, scale and speed of joining up the software, hardware and human input needed to exploit the opportunities that digital technology now has to offer vary significantly from one company to another. The most advanced are seeing new business models emerging.

A revolution has also taken place in electronic trading. As our cover profile interviewee, Cinnober ceo Veronica Augustsson, asserts: “The future is about technology.”

Our ‘Software for Trading’ feature section covers trends in CTRM software — driven by both cloud computing and regulatory requirements — and looks at the advantages achieved by one LME ring dealer’s choice to build a bespoke trading platform.

Our feature on India looks at how macroeconomic factors are entwined with the country’s steel and metal production industries and policies. And our non-ferrous technology section looks at how copper smelting technologies are dealing with more complex primary and secondary feeds; ways in which casting technologies are being refined to handle recycled material; and ways in which an established electrolytic technology for making metal powders is being scaled up, with additive manufacturing and high-tech alloys for future production, in smart factories, in mind.

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NFEx metals trading platform launches

Fintech firm Autilla – advised by former LME ceo Martin Abbott – has introduced its new base metals trading platform under the name Non-Ferrous Exchange Markets (NFEx), aiming for a live date in the first quarter of 2018.

NFEx will be a multilateral trading facility able to provide a cost-efficient, centrally-cleared venue to capture some of the over-the-counter (OTC) base metals business that has migrated away from exchanges in recent years, coo Mark Bradley explained to Metal Bulletin. “The market has moved and evolved to a point where there needs to be another offering, and that is hopefully us. NFEx is looking to attract the OTC volume that wants to be centrally cleared and create a bit more optionality,” he said.

NFEx will replicate a prompt date structure and maintain access to market based on the member-broker model – this means high-frequency traders will not be accepted as members.

BHP applies to develop new Australian mines

BHP Billiton has sought environmental approval to develop two new mines in Western Australia. BHP Billiton’s Nickel West proposal is to clear up to 842 hectares for two open pit mines, according to a notice from Western Australia’s Environmental Protection Authority.

“We are currently pursuing environmental approval as part of the study for the Mt Keith Satellite Project to provide BHP Billiton Nickel West with development options and maintain production for the future,” BHP said in a statement sent to Metal Bulletin.

Aqua Metals’ blueprint for future facilities

Aqua Metals plans to use the roll-out of its Nevada lead refinery as a blueprint for future facilities. With its AquaRefinery 1 unit now in commercial operation and generating revenue, Aqua Metals is “aggressively scaling up operations and ramping our capacity to reach 120 tpd by the end of’17,” ceo Stephen Clarke said. “These improvements and our ongoing work with our strategic partners is creating a blueprint for future facilities – both for our own and for our partners. Our goal is to roll out facilities in the rest of North America, China, the EU and elsewhere, based upon this blueprint,” he added.

Heron’s agreement with Louis Dreyfus

Heron Resources Ltd has entered into an offtake agreement with Louis Dreyfus Co Metals to supply metal concentrates produced at its Woodlawn project in the Australian state of New South Wales. The agreement will run from the beginning of production through the end of 2021, and covers 100% of the zinc, copper and lead concentrates produced during this period. “Zinc concentrates are particularly in short supply in the global marketplace, which is expected to remain tight for the next few years, and this has resulted in the company agreeing to attractive commercial terms for 100% of mine output during the critical first few years of production at Woodlawn,” Wayne Taylor, md and ceo of Australia-based Heron, said in a statement.

Rusal ready to resume smelter construction

UC Rusal is proposing to resume construction of its 750,000 tpy Taishet aluminium smelter in Siberia. “The company announces that it proposes to resume construction of the Taishet aluminium smelter including approval of top-priority works for construction of PC-1 (1st line) of Taishet in 2017,” it stated. Rusal announced the initial construction of the plant in 2007, only to shelve the plan in 2013 due to falling aluminium prices.

The Taishet smelter will include four potrooms, a casthouse, an anode plant, as well as energy-generating units and relevant infrastructure, Rusal says, and will primarily serve the Asian market.

Boliden expands Odda zinc smelting capacity

Boliden has expanded its zinc smelter capacity at Odda, Norway, to 200,000 tpy from 170,000 tpy to meet increasing European demand. “For the European zinc industry, it is a marginal increase of production but given the supply of renewable energy in Norway it is
a step in the right direction,” Bolden spokesman Klas Nilsson told Metal Bulletin. “Imports of zinc to Europe can decrease and likewise the environmental footprint.”

**Vale suspending Canadian nickel operations**

Vale Canada will suspend operations at its Birchtree nickel mine in the Canadian province of Manitoba. The mine, which began operation in 1966, will be placed on care and maintenance from 1 October. “The mine has been especially challenged over the past several quarters as it nears the end of its life-of-mine plan, and in light of the prolonged downturn in the nickel price cycle,” Mark Scott, vp of Vale’s Manitoba operations, said in a statement.

**Port Klang tin smelter ready by end of the year**

Malaysia Smelting Corp’s (MSC) new tin smelter in Port Klang could start up at the end of this year or by the middle of 2018, a company official told Metal Bulletin. Since the fourth quarter of last year, MSC has been refurbishing a lead smelter, bought in Port Klang, to convert it into a tin smelter that is more efficient and has more advanced technology than its existing Butterworth plant in Penang, the official said. Capacity at the Port Klang smelter is expected to be at least 30,000 tpy.

**ERG starts mining chrome deposit**

Eurasian Resources Group (ERG) has commenced chrome ore mining at the Pervomayskoye deposit in Kazakhstan. It has a capacity of 300,000 tpy of chrome ore and has reserves exceeding 3 million tonnes. The first 3,500 tonnes have been extracted at the Donskoy Ore Mining and Processing Plant, part of ERG subsidiary Kazchrome. ERG will continue to develop the mine until 2025 and aims to increase output at the processing plant to 6 million tpy of ore.

“The unique experience that we have gained at this pilot deposit will be beneficial to us in the future when we start to develop the second stage of the mine,” Mural Bekeyev, director of the Donskoy Ore Mining and Processing Plant, said.

**HKEX developing programme to link bond markets**

Hong Kong Exchanges and Clearing (HKEX) is preparing a pilot scheme known as ‘Bond Connect’ that will link China’s interbank bond market with the rest of the world, HKEX ceo Charles Li said. The scheme will give international investors the ability to trade bonds directly on the China Futures Exchange Trading System for the first time, Li said at the exchange’s 4th annual RMB Fixed Income and Currency conference.

**Almonty increasing tungsten production**

Almonty Industries will increase annual tungsten concentrates production at its Panasqueira mine in Portugal by about 10% as a result of a new tailings agreement with Cronimet Mining Processing. The contract, initially lasting five years, is expected to produce 100-110 tpy of tungsten concentrates, Almonty chairman, president and ceo Lewis Black told Metal Bulletin.

“Under the agreement, which is part of Almonty’s drive to increase efficiency at its operations, Cronimet will install and operate an X-ray ore sorter and other required equipment at Panasqueira, processing all of the tailings produced by heavy media separation at the mine. “We anticipate that this agreement with Cronimet will allow us to enhance productivity at Panasqueira and contribute to improved financial performance,” Black said in a statement.

**Kobe’s first Chinese aluminium panel rolling plant**

Kobe Steel inaugurated its first China-based aluminium panel rolling plant in Tianjin in May. The plant, managed by Kobe Steel’s subsidiary Kobelco Automotive Aluminium Rolled Products, has continuous annealing and surface treatment facilities with capacity to produce 100,000 tpy of aluminium panel material. “The launching of Kobelco Automotive Aluminium Rolled Products (China) enables Kobe Steel to supply aluminium panel material of the same high quality available in Japan to the growing Chinese market,” the company said.

**Hong Kong fines importers for hazardous e-waste**

Four importers, whose names have not been disclosed, from the USA, UK, Japan and mainland China have been convicted and fined a total of $94,000 for breaking Hong Kong’s Waste Disposal Ordinance by illegally shipping hazardous electronic waste into the country. Hong Kong’s Customs and Excise Department, alongside the Environmental Protection Department, intercepted 10 containers last November and December. The containers — which were intended for import into Hong Kong or transhipment to Singapore and mainland China — were found to have been full of hazardous e-waste valued at $630,000, including flat panel displays, batteries, circuit boards and toner cartridges. Each of the containers was rejected and immediately returned to its respective country of origin.

**Talnakh modernisation completed**

Russian nickel miner Nornickel has completed the Talnakh Concentrator modernisation project in the Arctic region of Northern Siberia. The project — initiated in 2014 and costing more than 47 billion roubles ($929.6 million) — has raised the concentrator’s capacity by more than 30% to 10.2 million tpy from 7.8 million tpy.

The Talnakh concentrator, which was built in 1981, processes rich ores mined at the Oktjabrsky and Talnakh deposits to produce nickel, copper and pyrrhotite concentrates.
Harsco’s international expansion
International mill services provider Harsco, which is headquartered in Pennsylvania, has formed a joint venture with Turkish steelmaker Tosyali Holdings to provide metal recycling services and slag sales at its Osmaniye plants. The JV aims to make further inroads in the Turkish steel industry by increasing the number of slag disposal plants within the country.

In India, Harsco has won a multi-year contract, worth more than $25 million, to provide metal recovery and slag sales services for Mumbai-based Tata Steel’s Kalinganagar facility – a new, integrated flat steel plant located in the Jajpur district of Odisha.

Usiminas to restart Ipatinga blast furnace in 2018
Brazilian flat steel producer Usiminas will restart the No.1 blast furnace at its Ipatinga works, in the country’s south-eastern Minas Gerais state, in April 2018. The move was approved by the company’s Board of Directors during a meeting in May. The restart will require an investment of around 80 million Reais ($25.15 million), according to the mill. The steelmaker decided to temporarily halt operations at the No1 blast furnace at Ipatinga in May 2015, as well as the No1 unit at its Cubatão works, in São Paulo state, because of weak market conditions.

Cliffs begins ‘Mustang’ iron ore pellet production
Cliffs Natural Resources Inc has started production of the new Mustang superflux pellet at its United Taconite mine. Cliffs invested $75 million to build a new storage facility, silos, a limestone crusher, conveyors and rail infrastructure to support the production of the Mustang pellet. The company broke ground for the project at a ceremony held in August 2016, and the execution of the project included an estimated 200,000 labour hours.

Bedrock completes Stelco acquisition
Bedrock Industries Group has finalised its acquisition of Stelco Inc, which had been operating under the protection of the Companies’ Creditors Arrangement Act since being granted an initial stay of proceedings in September 2014.

“This is an exciting day for Stelco and for all of those who have worked so hard to position this company for success,” said Alan Kestenbaum, chairman, Bedrock Industries. “We’re looking forward to operating this particular facility as a platform investment [...] doing what we can to improve operations, increase productivity and grow our business further,” he said.

“From here, we’re going to be looking to expand further and opportunistically [in terms of] our steel capacity – both integrated and [electric-arc furnace] – in North America and also worldwide,” he added.

SSAB to open Algerian office
Swedish steelmaker SSAB is planning to set up an office in Algeria. It aims to increase its focus on emerging markets, where “the penetration of high-strength steels is still low and growth potential is high, as customers upgrade their steel usage from standard to high-strength steels,” said Carl Robert Borgenstierna, area sales manager for SSAB Special Steels in North, West and Central Africa.

“In Algeria, there is a new law trying to reduce imports, which means [that] some automotive and transport solutions companies are thinking of investing in local manufacturing or assembly units, which in turn means new opportunities for SSAB. The list of challenges is long, but they shouldn’t be exaggerated either — they can be overcome,” Borgenstierna said.

London scrap merchant boosts capacity for deep-sea deals
UK scrap merchant S Norton has boosted its scrap processing capacity at its London site with the start-up of a new Henschel 1250 pre-compression shear machine. Active in deep-sea shipping to destinations such as Turkey, S Norton believes the new machinery can improve its export operations. The new machine is part of an investment of more than £10 million ($12.98 million) in the Barking, London, plant, including cranes and associated site works.

Feralpi continues export-led growth
Presider, a subsidiary of Italian steelmaker Feralpi, has opened a production and distribution centre in Paris, France. The new factory will manufacture and distribute steel products, such as pre-shaped round bar for reinforced concrete and electro-welded mesh which will be for use in French infrastructure projects such as the Grand Paris Express — four...
Evraz North America confirms Alberta plant expansion
Evraz North America Inc has approved engineering design work and ordering of long-lead-time equipment for a new heat treatment line at its Red Deer, Alberta, oil country tubular goods (OCTG) facility in Canada. “This project will allow us to better meet the growing need for premium OCTG products by approximately doubling the installed OCTG heat-treat capacity in this region,” president and CEO Conrad Winkler said. “This, along with prior projects that expanded premium threading capacity and increased our premium connections offering, demonstrates our commitment to supporting the evolving requirements of energy exploration companies in North America.”

Algerian Qatari steel starting rebar production
Algerian Qatari Steel (AQS) may start producing rebar at its Bellara steel complex in the north-eastern Jijel province of Algeria in July. The first bar mill, with a production capacity of 750,000 tonnes of 16-40 mm diameter bars, is completed and ready for start-up, as soon as the first phase of the electrical substation, supplied by ABB, becomes operational in July, a spokesman for Italian equipment supplier Danieli told Metal Bulletin.

Another rolling mill, with a production capacity of 750,000 tonnes of 8-16 mm bars, will be completed by December, according to Danieli which is supplying the steelmaking and rolling equipment for AQS. A third rolling mill with a proposed production capacity of 500,000 tpy of 5.50-14 mm wire rod and other projects will be completed “within the second half of 2018”.

Nucor to build $176m galvanizing line
Nucor plans to build a $176 million galvanizing and pickling line at its sheet steel mill in Ghent, Kentucky.

The new line, intended to produce material 72 in wide, is expected to be the widest HRC galvanizing line in North America. It will have capacity to produce 500,000 tpy for customers in the automotive sector.

“We have been growing our share of the automotive market, and this project will continue that trend,” said John Ferriola, Nucor chairman, CEO and president.

British Steel considers EAF
British Steel is considering the possibility of adding electric arc furnace (EAF) technology to its site in Scunthorpe, in northern England, executive chairman Roland Junck has said. “We are looking at what the ideal configuration of the plant at Scunthorpe should be,” Junck said. “Ideally, for a site like this one, you would have a hybrid layout.”

The set-up could combine Scunthorpe’s existing blast furnaces and the use of EAF technology, according to Junck. “Before, you had two worlds. You had black and white — you had blast furnaces or you had electric arc furnaces. The future of steel will be a combined method [where] you will use more hot metal in [EAFs] and you will try to use more scrap in converters.”

Bayik Demir starts ERW pipe production
Turkish steel service centre Bayik Demir has started commercial production of electric-resistance-welded tube at its facility in Konya, central Anatolia. The new facility has capacity to produce 360,000 tpy of tubes and pipes and started trial production in December 2016. There are currently six production lines at the facility, and a seventh will be added at the end of 2017, he added.

ArcelorMittal aims to restore Ilva
ArcelorMittal and Italian re-roller Marcegaglia aim to relaunch steelmaker Ilva as the number one Italian steel producer after their bid was approved by the Italian government. Carlo Calenda, the Italian minister of economic development, has signed a decree to transfer Ilva to the Am Investco consortium, which also includes Italian bank Banca Intesa San Paolo.

“Our teams are excited to have the opportunity to help Ilva re-establish its position as Italy’s premier steel company,” Lakshmi Mittal, chairman and CEO of ArcelorMittal, said. “Our plan is supported by a significant investment programme that will enable the company to improve its product mix, win back market share and address environmental issues.”

Liberty buys merchant bar producer
Liberty House has agreed a deal to buy the UK’s largest merchant bar producer, Caparo Merchant Bar, from the administrator of defunct former owner Caparo Industries.

“This is a business with a long history, a great reputation and a very strong order book. We are confident we can provide it with a secure future for the benefit all stakeholders,” Sanjeev Gupta, executive chairman of Liberty House Group, said.

“We can now supply an extensive range of both flat and long steel products, with steel mills in all parts of the country. This will enable us to compete more effectively and win market share from imports, helping to rebuild the UK steel industry,” he added.
Aluminium

Jury is still out on China’s supply-side reforms

Aluminium was a late and somewhat reluctant participant in the base metals rally at the end of Q2 as this market was still in corrective mode after its strong run-up earlier in the year. This market remains particularly sensitive to news from China about supply-side reforms, including a clampdown on illegal capacity and plans for temporary winter closures. It remains to be seen how effective these measures will be. Up to now, in our base case scenario, we have not factored in any near-term impact from the rectification of the illegal capacity, but we have factored in the winter production cuts. Even so, our base case model still shows Chinese production will be 34.87m tonnes this year, up 9.5% from the level in 2016. The risks are that supply will end up surprising on the upside. If the aluminium bulls of Q1 and early Q2 take this view too, then we are likely to see more liquidation of stale long positions.

Copper

Higher prices expected in H2 2017

The market was wrong to allow lower Chinese copper imports this year to paint a bearish picture about Chinese demand. The fall partly reflects the mobilisation of stockpiles previously held for financing purposes, while imports of scrap and concentrate have both been higher. As for ‘real’ Chinese demand, year-on-year growth over the first five months has been recorded for the output of copper semis (6.8%), power cables (7.5%), air-conditioners (20.8%) and refrigerators (3.9%), while grid investment was up 9.5%. Although data for June are not available yet, we do know that domestic cathode stocks (SHFE and bonded warehouse) plummeted last month by 107,000 tonnes or 13.4%, so the robust real demand from January-May clearly ran on into June. With manufacturing indicators outside China also still robust, and raw material markets tightening, copper seems well set for further price appreciation in H2. Our base case envisages prices re-establishing themselves sustainably above $6,000/tonne in Q4.

Lead

Pricing in tighter fundamentals

LME lead prices rallied 13% in the second half of June to end Q2 at $2,323/tonne, from a recent low of $2,052/tonne on 12 June. The move suggests sentiment has turned more bullish again amid a realisation that the fundamentals have been tightening. Given ILZSG data showing a large deficit during January-April, and exchange stocks falling since then, that price reaction is not too surprising. If the extra lead scrap brought out by the last major rally late last year and early this year has now worked its way through the supply chain, then secondary supply may be more restrained going forward, which may keep the latest rally underpinned. It may take higher lead prices, combined with higher zinc prices, before primary supply can respond via idle lead-zinc mine capacity being reactivated. However, the demand side of the market may face headwinds as we expect vehicle sales to suffer this year after strong growth in recent years, especially in China.

Nickel

Don’t expect too much

Nickel prices worked higher into the $9,300s in late June to five-week highs. However, nickel’s performance is still disappointing, reflecting the uncertainty about ore and NPI oversupply. The Philippines’ new environmental secretary will decide this month what to do with the mines suspended or closed by his predecessor. The wait goes on, but the feeling is he will be more lenient. INSG data has implied a modest global deficit in the year to April, but the concern is about the future. Although we hear that prices below $9,000/tonne recently triggered NPI production cuts in both China and Indonesia, it may not be long until the price rebound in late June encourages restarts, especially in China where ore availability is improving. Likewise, although LME and SHFE stocks are falling, the overall total is still so high and the decline too shallow to change market sentiment. So, barring any surprises, we are still resigned to choppy sideways trading in the coming months.
Tin
Mildly bearish on H2 2017
The big news for tin in the past month is the award by the Chinese government of a tolling licence for Yunnan Tin. The likelihood of a pick-up in Chinese tin exports at some point during H2 2017 has risen significantly. There is clearly oversupply in the country, as SHFE stocks more than doubled over H1 to end June at a record 5,042 tonnes. If Beijing’s policy changes, including cancelling the export tax at the start of the year, now contribute to shifting China’s surplus to the international market, LME prices will come under pressure. There have also been reports about off-market stocks in Singapore. If true, and if this material starts being fed back into the market, prices will have an even bigger job on their hands to stay in touch with $20,000/tonne. We are now mildly bearish on the outlook for prices in H2, though expectations of declining mine supply from Myanmar may turn out to be a saving grace.

Zinc
Conservatively bullish
Zinc ended Q2 strongly, but at the moment we are not convinced that this sort of rally is going to be sustainable. Falling exchange stocks and Chinese bonded warehouse stocks suggests the fundamentals are already tight, particularly in China. But we are conscious that tightness was well priced in by last year’s rally and we wonder what is required to see prices taken to the next level beyond $3,000/tonne. There are downside risks to consider too, notably from off-market stocks that may be mobilised by tight nearby spreads, from restarting Chinese smelters after the coordinated maintenance breaks through Q2, from rising mine supply loosening the concentrate market, and from the threat of Glencore’s restarts. On balance, we are comfortable with a conservatively bullish outlook for H2 as our base case, though that involves some choppy sideways trading between $2,500/tonne and $3,000/tonne.

Ask an analyst
With H1 2017 over, what will be the key drivers for the base metals in H2?
Each of the base metals has an evolving supply-side story that will help set the tone for H2 2017. For aluminium, the focus is firmly on China and the supply-side reforms the country’s government is attempting to undertake. The market has discounted a significant production cut one way or another, but we are wary about expecting too much. There is room for disappointment, which could increasingly weigh on prices in H2.

The surge in scrap supply that was a feature of the copper market in H1 is being digested. However, the big mine disruptions of Q1 are yet to be fully felt downstream and the Q2 reporting season may well highlight that the major miners are still struggling. Plus, disruption risks are ever-present. We think copper supply will tighten in H2, supporting prices.

In nickel, we are still waiting for the new environmental secretary of the Philippines to show his hand, but he is unlikely to be as anti-mining as his controversial predecessor. That means more Philippine ore feeding China’s NPI industry than we might have expected six months ago. Meanwhile, ramp-ups in Indonesia continue apace, which is also a bearish drag. Nickel bulls might get some respite though if these low prices force more closures among traditional nickel miners.

Analysis by Andy Cole, Metal Bulletin Research

Every month an MBR analyst answers a question raised by readers. If you have a question for our analysts, please email: acole@metalbulletinresearch.com

Analysis by Andy Cole, base metals analyst and editor of MBR’s Base Metals Weekly Market Tracker. Email: acole@metalbulletinresearch.com

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MBR analysis

Steel

Upbeat mood on trade cases and Chinese revival

Trade protectionism dominated the news agenda in June, turning sentiment more bullish and aiding price increases that might not otherwise be supported by market fundamentals. The most notable is the ongoing Section 232 investigation in the USA, which could result in duties and quotas on imports if the final report concludes that imports affect national security. Expecting a swift resolution, US steelmakers started to announce $30/short ton increases to coil and later plate prices in early June, and by mid-month those hikes translated into higher spot prices.

In Europe, producers are also waiting for the final decision by the European Commission on a case of HRC imports from Brazil, Iran, Russia, Serbia and Ukraine, hoping that duties would stop price erosion that started in early Q2. However, as the EU HRC imports market is now dominated by Turkey and India, not part of the investigation, the impact of any levies may be limited. The flow of flat steel imports into the EU remains high, averaging at 1.9 million tonnes in the first four months of the year, while domestic crude production is increasing, up by 4.1% year-on-year during January-May. Rising supply, particularly in the form of lower-priced imports, put pressure on flat prices in Europe, which saw another month of decreases in June.

The situation was more positive for Chinese mills, which saw a sharp increase in margins, especially for rebar. According to MBR calculations, rebar margins averaged near $140/tonne in June, against $70/tonne for HRC. However, construction demand in some parts of China was weakened by wet weather conditions, and with investment growth already slowing earlier in the year domestic rebar prices started to trend down. The flats market has tightened, as falls in production coincided with steady growth of demand, which led to rises in local and, subsequently, export Chinese HRC prices as we predicted.

Ramadan meant that many markets in the Middle East were practically at a standstill and Turkish export rebar prices remained unchanged. However, we expect that mills will soon start targeting higher prices, following recent scrap price gains, and there is a small chance they will find success as, at the end of June, Turkish rebar exports were pegged at a discount to both Chinese and CIS fob offers.

Rises in the Chinese flat market have started to have a bellwether effect on other seaborne prices, giving hope to many producers that a threat of lower-priced competition from imports will lessen. However, unless imbalances of supply and demand are addressed with production cuts, as recently seen in China, any upturn will be temporary.

Analysis by Marina Maliushkina, Metal Bulletin Research

Steel raw materials

Iron ore and coking coal prices get a grip

Although seaborne iron ore prices took a hit and fell to the lowest level since last year, they made a comeback by the end of the month, recovering by 21% in just over two weeks. Solid profit margins for Chinese mills have in fact given iron ore prices a strong tailwind. By our calculations, Chinese HRC margins tripled month-on-month to above $60/tonne. Rebar producers continued to see margins strengthen to above $140/tonne on average. These margins have incentivised mills to keep producing steel and consume iron ore. Buying high Fe-grade feedstock to keep productivity rates high has driven the premium for 65% Fe fines, pushing it above 28% of the price benchmark for 62% Fe fines. Utilisation rates rose to their highest in years, running at above 87% during the last weeks of June. However, crude steel output has slowed down from the nearly 5% year-on-year surge in Q1 and it is not expected to return to those levels as the effects of the stimulus measures fade. That said, it seems the downward market correction over the past four months has been enough for prices to stabilise. The iron ore surplus which was created in Q1, with domestic producers in China boosting output by 16% year-on-year to nearly 300 million tonnes, was followed by much slower growth in Q2.

Like iron ore, seaborne coking coal followed a downward trend in June both in and outside of China. After most Australian metallurgical coal producers declared force majeure because of cyclone Debbie, exports from Queensland plummeted by 47% year-on-year in April to 8.9 million tonnes. This shortfall was covered by other exporting countries like Mongolia and Russia, and even China. Having paid much more than the odds in the first quarter, coking coal buyers have been forced to rethinks. After delayed negotiations for second-quarter benchmarks due to the supply disruptions, Japanese steel mills have decided to adopt indexation methods to settle. The negotiated settlement figure for the second-quarter coal benchmark is likely to be established close to the MBR Index of $191/tonne and applied retrospectively.

The perceived shortage of high-quality industrial scrap in the USA and overseas in Europe, where prime grades are also now at a premium to shredded, continues to sustain the premium between prime, industrial grades and obsolete grades. In Turkey, prices have remained stable since May, as local mill margins have recovered from Q1 lows, while in China, domestic scrap prices have been reviving in recent weeks. Should tight supplies persist, against our expectations, so pig iron premiums over scrap and DRI will remain unusually high.

Analysis by Miriam Falk, Metal Bulletin Research

For access to MBR’s detailed product and regional price, supply and demand forecasts or for a free sample of MBR’s Steel or Steel Raw Materials Market Trackers: www.metalbulletinresearch.com
Regional review

North America
Myra Pinkham

Differing views on Section 232

While both steel and aluminium executives have touted the value of their respective metals to domestic national security, the US aluminium industry clearly is seeking a different type of trade relief to that of the steel industry.

During the steel Section 232 hearing, held by the US Department of Commerce (DoC), most US steel executives asked for broad-based quotas and/or tariffs, both relating to the countries that export steel to the USA and the types of steels being imported.

At the aluminium Section 232 hearing it was suggested that while action should be broad-based from a products perspective, it should focus upon China.

Heidi Brock, president and ceo of the Aluminum Association, asked that any remedies applied under Section 232 should not impact trading relationships between the USA and critical trading partner countries that have been determined by the DoC to be operating as market economies—especially Canada and the European Union.

Jeff Henderson, president of the American Extruders Council (AEC), agreed, stating: “The crisis confronting the US aluminium industry is China, plain and simple.”

He continued: “As with other critical industrial sectors, China’s aluminium strategy is to continue to build production capacity and employ tens of thousands excess workers by artificially increasing aluminium output,” and that it uses “massive subsidies and other protectionist and environmentally destructive policies” to accomplish these “market-distorting objectives.”

Brock did not suggest that the Administration impose quotas or tariffs, but rather supported a negotiated agreement with China resulting in measurable reductions in Chinese aluminium capacity. Henderson says that the AEC opposes the imposition of primary aluminium tariffs as that would adversely impact the ability of US producers of extrusions and other semi-fabricated products to compete against imports from other countries. “But the Administration should impose duties on aluminium extrusions from countries that are allowing China to evade our orders,” he said.

Asia
Shivani Singh

Bond Connect

The much-awaited China-Hong Kong Bond Connect which links the over $9 trillion onshore bond market in China with overseas investors launched on 3 July.

The China-Hong Kong Bond link for “northbound trading” allows overseas institutional investors to buy and sell Chinese bonds. The “southbound trading” of Mainland investors trading major overseas OTC bond markets via Hong Kong will start later.

The first day saw 89 financial firms conduct 142 transactions worth RMB7.048 billion ($1.02 billion), trading Chinese bonds via the Hong Kong exchange and China Foreign Exchange Trade System.

“Bond Connect will give Hong Kong a bigger role in fixed income, expand our mutual market programme from stocks into a second asset class and give us a good foundation for further development in FIC [fixed income and currency],” said HKEX chief executive Charles Li on launch. “Even more importantly, the programme is a great example of the value that Hong Kong can bring to China, as well as the benefits we can enjoy when we connect China and the international community.”

The Bond Connect is widely seen as building an eco-system for increased capital flows between China and rest of the world. It portrays the liberalisation of China’s capital market and along with steps towards further internationalisation of the yuan will create opportunities for investors at home and in the world.

“It is a milestone in the internationalisation of the RMB because it will greatly enlarge the pool of investable assets denominated in RMB as global investors will be able to hold and trade more RMB-denominated assets,” Ivan Chung, associate managing director, Greater China credit research and managing director, Greater China credit research and Moody’s told Metal Bulletin Magazine.

He added that the rising internationalisation of the Chinese onshore bond market, as facilitated by Bond Connect, will equip onshore bonds for inclusion in more global bond indices.

Europe
Richard Barrett

Managing electoral expectations

The outcome of the UK’s general election in June has become a case study in the political perils of failing to meet expectations. While the Conservative party won the most parliamentary seats—with 318 MPs, 56 more than the next largest party (Labour) – it came out of the election with 13 fewer than before and lost its clear parliamentary majority, rather than increasing that margin as it had hoped.

The government has consequently been obliged to find an extra £1 billion (about $1.25 billion) of public spending in Northern Ireland as a condition for the support of 10 Democratic Unionist Party MPs in crucial votes when the government looks to push through a legislative programme on which Brexit sits firmly at the top of the agenda.

The ‘strong and stable’ government of the kind that prime minister Theresa May had set out to create through winning a bigger majority has thus failed to materialise, generating calls for a significant change in her style of leadership and questions about how long she will be able to remain in post.

How different the outcome has been in France, with a triumphant, pro-European Emmanuel Macron sweeping to power as president and his new party, En Marche!, winning over 300 seats in the French parliament of 577.

Although voter turn-out for the French parliamentary elections was low, Macron has won a clear mandate and generated high expectations for delivery of the kind of deep reforms he promised while campaigning. Political analysts say that he will need to act quickly, while he still has momentum, to push through fundamental changes to the way that France does business, before the inertia of those preferring the status quo has a chance to re-establish.

Next, Germany’s elections in September. If Angela Merkel retains power, it will be interesting to see how well she and Macron will work together towards rejuvenating Europe.
Middle East
Serife Durmus

Trade weakens as tension increases

Steel trade was weak in the Middle East during May, due to the Islamic holy month of Ramadan, but the tension between Qatar and its neighbours is the hot topic in the region.

Saudi Arabia, Bahrain, the UAE, Yemen, the Maldives and Egypt have broken off diplomatic ties with Qatar, claiming that the tiny kingdom is funding terrorism and meddling in the internal affairs of other Gulf Cooperation Council (GCC) members. A trade embargo imposed on Qatar – its air, sea and land borders have been closed – is preventing steel deliveries to the country from being made. Some trucks carrying steel have been stuck at the borders, a UAE source said.

Fifa’s football World Cup is scheduled to take place in Qatar in 2022 – and the country is carrying out multiple construction projects to enable it to host the event – however, there has been speculation that Fifa could switch the location of the world’s biggest sports tournament.

Despite these concerns, the international rebar exporters association, Irepas, does not believe the crisis will be long-lived. “The new political crisis in the GCC region has added to the uncertainty in the global market,” Irepas said on 6 June. “The crisis will probably be resolved quickly, however, as it is bad for the region as a whole,” Irepas added.

Elsewhere in the region, Egypt’s El-Garhy Steel Group will start production at its new steel billet and rebar plants in Suez by the end of 2018. Located in Ataqa industrial zone, the billet plant will have the capacity to produce 1.20 million tpy, while the rebar plant will be able to produce 500,000 tpy. The total investment in the two plants will be E£3.60 billion ($198.20 million).

Turkish steel service centre Bayik Demir has started commercial production of electric-resistance-welded (ERW) tube at its facility in Konya, central Anatolia. The new facility has the capacity to produce 360,000 tpy of tubes and pipes.

Latin America
Ana Paula Camargo

Brazil divided on imports of coated steel

The Brazilian steel industry is again flirting with a trade measure against imports of zinc-coated steel products.

In 2012, the Brazilian government finished an investigation against imports of galvanized, galvalume and pre-painted steel from Australia, China, India, Mexico and South Korea, and decided not to establish any duties as it could not confirm damage to the national sector. The probe was opened following a request from local steelmaker CSN.

This time, the investigation would only include imports of zinc-coated steel produced in China and South Korea, according to the Brazilian flat steel association, Inda.

Imports of zinc-coated steel, which includes hot dipped galvanized sheet, galvalume and electrolytically coated steel, totalled 58,561 tonnes in May, of which 92.80% came from China, and 2.80% were from South Korea, Inda data show.

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Fifa could switch the location of its football World Cup – however, there has been speculation that Fifa could switch the location of the world’s biggest sports tournament.

A fourth source believes that the approval of an existing hot rolled coil anti-dumping probe against imports from China and Russia, expected in the second half of the year, may stimulate the government to “at least analyse a petition involving coated steel goods”.

CSN, Usinas and ArcelorMittal are among the producers of zinc-coated steel in Brazil.

African mining industry.

Upset at South Africa’s new Mining Charter

South Africa’s recently unveiled Mining Charter has scared away investors in mining companies, slicing more than ZAR50 billion ($3.7 billion) off mining companies’ market value on 15 June, the day the charter was announced.

The controversy of the new regulations includes a new black economic empowerment requirement, raising the minimum threshold for black ownership of mining companies to 30% from 26%, giving resources companies 12 months to meet the target amidst a raft of other regulatory requirements. The charter also requires a 51% black shareholding in all new prospecting licences and payment of black shareholders before any other dividends are paid out.

The charter was announced, warned that the charter is credit negative for South African mining companies because of the cash flow burden the new regulations are placing on companies by adding to the cost of operating mines in the country.

“We expect that current shareholders are unlikely to support a further dilution of their equity interests,” the rating agency noted.

The charter will not take deals already concluded into consideration or give credit to deals where black shareholders have since divested.

The industry immediately reacted against the charter, stating that the Department of Mineral Resources did not consult it about proposed changes. Investors clearly demonstrated their fear of investing in South African firms by continuing their initial sell-off after the 15 June announcement.

The rand currency also lost ground, reflecting investor fears about the stability of South Africa as an investment destination.

The Chamber of Mines, which represents in value 90% of the country’s mining companies, is challenging the charter in the Constitutional Court. The Chamber slates the charter as unconstitutional, illegal, and said it could destroy the South African mining industry.
Veronica Augustsson

“The future is about technology”

As head of a company providing solutions for international trading and clearing houses, Cinnober ceo Veronica Augustsson is passionate about technology. She tells Andrea Hotter about her route to the top and her vision for the future.

When Veronica Augustsson started playing handball at the age of five, little did she know that it would trigger a sense of teamwork that would eventually see her named one of the top ceos in the technology world. Continuing to play the sport for 20 years, Augustsson, the 38-year-old ceo of financial technology firm Cinnober, says the experience gave her a sense of responsibility which translated well in the business world.

“Handball is fairly tough and physical, and it’s actually only six people on the field, so you have to work running backwards and forwards – you have to do everything,” she tells Metal Bulletin Magazine. “I didn’t think about that aspect when I was younger, I just had a passion for the sport, but in hindsight I see that it taught me that you can’t just hand over to someone else – because it’s a game with so few people, you have to always perform. It actually formed how I view responsibility, how to take something from A to B and ensure it is complete,” she adds. It is a lesson that she took into her professional career, which saw her named one of the technology industry’s most powerful executives this year, to add to numerous other awards in recent years.

Augustsson chose to study computer science – “I’d always loved science, logical things, and also had a curiosity” – picking the course in 1998, when information technology was still relatively new.

“I wanted to be in an industry that was moving, developing; I’m not a great person in just maintaining the status quo. I wanted to be part of the journey of technology – I had no idea where that journey might take me, but I just felt things...”
Profile

‘I think the best solution comes through dialogue – we can work out what we can achieve through technology by having a conversation’

Graduating with a master’s degree in computer engineering from the Royal Institute of Technology in Stockholm, Swedish-born Augustsson joined Cinnober as a developer. A relatively new firm, Cinnober had been established two years earlier, building trading systems for exchanges.

It was here that Augustsson first encountered the London Metal Exchange (LME), which was preparing to develop its systems as well as an electronic trading platform. She joined the team to support its floor systems and building out LMEselect, which was launched in 2001, and has been part of the evolution of the LME’s traditional model as it moved into the electronic world ever since.

“The LME more or less had LMEselect as a back-up system, as the trading floor was where all trading was happening. We were part of the whole transition, moving from manual to digital and being the vendor for almost 15 years,” she says.

Augustsson was also a developer in Cinnober’s project for the former American Stock Exchange (AMEX) for its options trading system. It was a move that took her to New York, a city’s whose life and energy she fell in love with; “Every time I go I feel like I’m coming home,” Augustsson says.

It was a very formative year in other ways. Augustsson spent a year on the AMEX trading floor, alternating between one week supporting its floor systems and another week at the data centre where Cinnober hosted the service. “That year in NYC gave me an experience that was invaluable as I couldn’t get that sitting by a computer. I lived it,” she tells Metal Bulletin Magazine. “I saw the look in traders’ eyes when they made a bad deal – you realise how important the system is for them, and that you’re really delivering the heart of their business, something they rely on, trust and need to ensure its 100% availability,” she says.

“That gave me a very good platform to understand how to develop systems in the future, what questions to ask, how important the systems were, as well as understanding how everything came together in an ecosystem – to know the value chain,” she adds.

Returning to Stockholm, Augustsson went back to development. Her next project was to build Turquoise’s trading system for Multilateral Trading Facilities, one of the first in Europe after MiFID I opened up competition in Europe.

According to Augustsson, start-ups like Turquoise — a European multilateral trading facility majority-owned by London Stock Exchange Group — have a natural advantage because they lack legacy issues. Working closely with Cinnober and using its technology, Turquoise was running its entire exchange with about 35 people, “An eye-opener of what you can actually achieve if you use technology to its maximum.”

“I think the best solution comes through dialogue – we can work out what we can achieve through technology by having a conversation,” Augustsson says. “I believe in partnerships, and our ambition is never to be the expert in how to run an exchange or clearing house, but instead to work with others and understand the different approaches, make recommendations, and explain what is also possible with technology,” she adds.

Success in sales

As her career continued to develop, Augustsson was offered the role of Cinnober head of sales in 2012 – not something she had previously envisaged herself doing.

“If someone had asked me ten years ago whether I’d have been interested in working in sales, I’d have laughed and said ‘No, I’m a developer!’ But I worked very often and closely with customers to understand their situation so I could do technical sales support, I was very interested in finding technical solutions to the issues that customers presented,” Augustsson says, adding: “Once I had redefined the role it was an obvious thing to do.”

In her new role, the company was very successful in signing new customers — one of which was the new clearing house for the LME. “Again, we had the possibility to start from scratch. It was in parallel with Hong Kong Exchanges & Clearing acquiring the LME, and we were part of the whole journey of hiring the first person and building out our technology while they were building out the business,” Augustsson says. “LME Clear is about 40 people running a clearing house, which is very rare when you look at other clearing houses. We’re very proud of those solutions,” she adds.

First female CEO

According to Augustsson, Turquoise was building out the electronic world ever since.

“Again, we had the possibility to start from scratch. It was in parallel with Hong Kong Exchanges & Clearing acquiring the LME, and we were part of the whole journey of hiring the first person and building out our technology while they were building out the business,” Augustsson says. “LME Clear is about 40 people running a clearing house, which is very rare when you look at other clearing houses. We’re very proud of those solutions,” she adds.

Around nine or ten months later, Augustsson was offered the role of company CEO. The timing was a little unexpected; she replaced outgoing CEO Javier Tordable after he had been just six months in the role.

“I was only 33 at the time. I had two small kids,” she says. “I was really passionate about using technology to change the financial ecosystem and I knew I had great team members to achieve this, great customers, and saw the difference we could make with technology, so I immediately said ‘Yes, I would like to do this.’”

Drawing from her sports influence, Augustsson says developing talent in her new role is key and compares her colleagues to national sports team players. “You can’t just add new developers – if you’re a national soccer team, you can’t just take any player; they’ll ruin the game,” she says. “We can’t take someone from a lower league – we might coach and train younger people – but we look for talent and when you do that comparison, you realise it makes sense,” she adds.

Right now Augustsson is focused on motivating her colleagues – as she puts it, how to get people committed and to respond quickly. “In the past it had been up to me or a small team, not working with 300 people to get them all committed, working on what buttons to push to trigger that. I’m working to understand the individuals to get them motivated as a team,” she says.

Although she is the first female CEO of Cinnober, Augustsson says...
that she does not view herself any differently to her male peers.

“I’m very results-driven and demanding, and that helps me because I always see myself as equal to anyone,” she says. “I don’t see myself as female; I think of myself as a human, and that’s how I look at others, which helps me — too many females think of themselves as female, which isn’t wrong, but all of a sudden you’re differentiating yourself from others who are not female,” she adds.

Technology is still a very male-dominated profession, a fact that Augustsson acknowledges. “In schools today, unfortunately there are still too few girls interested in technology. Surely, if you see technology as being as important as reading, writing and mathematics, and you realise that only half the population has an interest in it, then immediately this should be addressed? In my world that is as alarming as having half the population educated in reading or writing,” she tells Metal Bulletin Magazine.

“We have to start extremely early to make it interesting for everyone — you don’t have to become an expert, but I believe that everyone should have a basic knowledge of technology,” she says, adding: “If you look at personnel that are available to hire, the majority are male. This is negative because 50% of the talent is just not made available.”

Diversity is clearly important for Cinnober. The company has its roots in Sweden, but the business employs people from over 40 different nationalities. “In New York or London that might not be very odd, but in Stockholm it’s pretty rare. It’s something we’re proud of and that our people don’t think about any more,” Augustsson says.

Cinnober evolves
As trading needs changed, so too did Cinnober. In around 2000, manual trading floors started to close and were replaced by electronic trading, marking a transformation into a digital world that Cinnober was at the heart of.

Augustsson says that in the beginning, companies were extremely proud of their histories and how they traded, so they wanted a proprietary market and protocols, making exchange worlds “exclusive clubs that would be a bit tricky to enter.”

This continued until standardisation, she notes, after which competition based on price and speed-driven algorithmic and high-frequency trading rather than functionality eventually helped to drive the collapse of Lehman Brothers in 2008.

“When the crisis started and Lehman crashed, we realised Cinnober was extremely exposed as a business to exchanges only. No-one was looking to change their trading systems, so we realised nothing had been done on the clearing and post-trade side,” Augustsson says. “Clearing systems had been built in the 1980s and 1990s, when trades were stored in a database, with risks calculated several times a day for marging. This was fine in that world, but in 2008 companies could default in a few minutes, so it didn’t match the environment. The whole industry is built on trust, and the Lehman crash was the ultimate lack of trust,” she adds.

Cinnober’s view was that clearing should be done in real-time — something that exchanges were initially sceptical of. But a massive project with Brazilian stock exchange BM&FBOVESPA — to integrate its four clearing houses into one entity — started to change that.

“BM&FBOVESPA wanted to merge different asset classes and calculate risk and clearing in one system, so the first day of production we freed up capital to the clearing members to the value of $9 billion,” Augustsson says. “Volume more or less doubled in a day as they took this money and reinvested it in trading. Now a few years later BM&FBOVESPA has almost tripled its volume,” she adds.

Cinnober has since won projects with more clearing houses, one of its latest being for the Japanese capital markets. Then after working with infrastructure players, the company decided around three years ago to expand to target the technology needs of banks and brokers.

It has meanwhile been selected as the chosen provider in the London Bullion Market Association’s Request for Proposal (RfP) process. “The launch is on track, we have a few members already starting to publish. It’s still voluntary and it will become mandatory,” Augustsson adds.

The company also recently acquired UK-based market surveillance specialist Ancoa Software, which works with exchanges, regulators, buy- and sell-side firms.

Digital world
According to Augustsson, technology is becoming ever more commoditised. “A long time ago it was a benefit to have your own system with your own developers where you could control everything, but nowadays that competence and extreme knowledge is not what banks or exchanges should be focusing on — they should be focused on running their business,” she says.

One advantage of modern technology is the release of capital for use in other parts of a business, she notes.

“Anything where you can use a computer or data science instead”
of humans is appealing. Take driverless cars for example – the car industry doesn’t estimate that all accidents will be removed by removing the driver, but it estimates that 93% will be removed. Humans make mistakes, but that’s very costly,” she says.

“The main cost is when you start to do something wrong, not when it is going smoothly. If you can remove 93% of errors then it’s extremely cost-efficient. Going forward we’ll do much more analytics, much more machine learning. It isn’t that we want to remove humans 100%, but in the parts where technology can replace it, it makes sense,” she adds.

Fears continue to exist around technology, whether the threat of hacking, high frequency trading or artificial intelligence. Augustsson says one reason people are so scared by technology is confidence, and that looking to the future is critical.

“I’m passionate about the finance industry – it’s run by brilliant, smart people and the world couldn’t function without it. It’s been built up by business people and going forward five, ten, 20 years ahead, you realise that the future is about technology,” she notes. But business people are “afraid of making the technology decisions because it’s not their domain,” she says.

“If Facebook CEO Mark Zuckerberg was running a bank, would it look like any other bank? My spontaneous thought is no, it wouldn’t. It would look very different, and he would have a very different approach to the decisions he is making for the future,” she adds. Similarly knowledge is important. “If it’s not your core, then it’s scary. Because of that, it’s so much easier if you look back at how things used to be, because then you have the answer,” Augustsson says.

She acknowledges that software development and cloud-based solutions are relatively new, but says fear is the wrong response. “Instead of saying ‘I’m afraid of the cloud and would never give away my data,’ you should instead say, ‘It makes much more sense to work with a specialist in this with the best safety you can imagine,'” she says. “It may not be what you want but it’s the future, and if we work together and specify requirements then it can work well. Instead there’s so much negativity,” Augustsson adds.

To a certain extent, regulatory changes are hastening advances in technology. Trade reporting under MiFID I requires trade reporting for equities, but MiFID II will expand this to other asset classes when it takes effect next year. Although Augustsson says that not everyone is ready for new pending regulation, she believes many are on track. Yet the lengthy process of developing regulation can potentially have a negative impact on the financial world.

“It’s almost taken ten years to come up with MiFID II and during that timeframe it has limited innovation as people knew it was coming, but didn’t know what it would look like. As a result, companies didn’t invest in technology,” she says.

“I’m pro-regulation — we need it, it goes back to trust — but it needs to be right balance and it can’t take another ten years to come up with MiFID III, so they should take it in smaller tranches. Regulators need to give guidance on what you can and can’t do as new regulations are being developed — otherwise it just limits innovation and development,” she adds.

A child’s view
On the flipside, innovation and development will come from the next generation, says Augustsson, whose own children have given her first-hand experience of their approach to technology.

“It is fascinating because kids are so curious, and aren’t told what is right and wrong. They try everything, they look at things from a perspective I don’t have because I have a filter. That’s appealing because sometimes you have to remove that filter and look at things as if you were a three-year-old,” she tells Metal Bulletin Magazine. “They don’t really understand what countries are and they don’t really care either, but they know what Google and Angry Birds are, which is from the point of view that they assume everything is available 24/7,” she adds.

This lack of pre-conceived ideas means that children do not mind where a product or service comes from, she believes, in contrast to more traditional people in the exchange industry who tend to prioritise their own domestic firms.

“Children have grown up with technology, and they’ll get a shock if they enter into our world today and work with applications that we use, because they were designed ages ago and it’s such a complicated, illogical workflow sometimes,” she says. “I believe that when that generation enters the workforce, it’ll revolutionise it because no one will buy anything that doesn’t look like what they’re used to,” she adds.

Are her own children, a son of age eight and a daughter of age six, interested in computer science? Augustsson says they’re “very curious,” but take technology for granted, which she didn’t at their age. She is encouraging them to have a basic level knowledge of technology at the very least going forward. “For me, technology was something new, I keep telling them I was 18 when I got my first phone and it wasn’t even an iPhone. I don’t think they can understand how life was before then, and if they ask me something and I don’t know the answer, they tell me to Google it,” she adds.

When she isn’t spending her spare time with her family, Augustsson’s love of sport continues. She has run the Stockholm marathon and numerous half-marathons, and plans to run the Berlin marathon for the first time in September. She also recently completed a 24-hour multi-sport competition; running, cycling and canoeing with a team of four people in northern Sweden.

Augustsson is also a keen reader of books, particularly about new technology. “I’m very curious about how the brain works, how you can influence and maximise your brain,” she says. “Is it working? I hope so!”
People moves

BHP gets new chairman

The BHP Board has elected Ken MacKenzie to succeed Jac Nasser as chairman. MacKenzie will take on the role from 1 September 2017, following Nasser’s retirement as both chairman and a non-executive director.

MacKenzie joined the BHP Board as a non-executive director in September 2016 and is a member of the Board’s Sustainability Committee.

Arconic promotes Roegner

Eric Roegner, chief operating officer of Investment Castings, Arconic Titanium and Engineered Products and president of Arconic Defense, has been named president of Arconic Global Rolled Products. He will also continue as president of Arconic Defense. Roegner succeeds Kay Meggers, who has left Arconic to become a faculty member at the Gordon Ford College of Business at Western Kentucky University.

New president and ceo at Metso

Nico Delvaux has been appointed president and ceo of Metso by its Board of Directors. He is taking over from Matti Kähkönen, who will act as a senior advisor to the Board until he retires. Delvaux will be joining the company from Atlas Copco, where he held the position of president of the Compressor Technique business area.

Little joins Rusal

Mark Little has left the nickel department of Glencore to join Russian aluminium producer Rusal in Zug, Switzerland, as its price risk manager. Little, who has spent four years at Glencore, was most recently the head of its LME nickel trading desk and precious metals sales and trading.

Sheffield Forgemasters’ chairman retires

Tony Pedder is retiring from his role as chairman of Sheffield Forgemasters International after 12 years’ service. He has been in position since a management buyout in 2005. Pedder is a former ceo of Corus plc and still has affiliations with steelmaking and manufacturing as a director of Metalysis Ltd, a director of EEP Ltd and chairman of Albion Steel Ltd.

Vallourec appoints Longueville

Vallourec has announced Barthélemy Longueville as its chief digital officer. As the group puts its Transformation Plan into action, Longueville’s task will be to steer Vallourec’s digital strategy, alongside Philippe Crouzet, chairman of the Management Board.

Bastos resigns as MMG’s coo

MMG’s chief operating officer Marcelo Bastos has resigned from the company and will depart in August this year, the company has announced. Bastos assumed the role of coo in 2011 and was responsible for all of MMG’s operating assets, assuming responsibility for marketing in 2015.

New director for Glencore

The Board of Glencore has announced the appointment of Martin Gilbert as an independent non-executive director of the company. Gilbert is a co-founder and chief executive of Aberdeen Asset Management PLC.

Alvaro Insa joins Cliveden Trading

Alvaro Insa, the former head of lead and zinc trading at Transamine in Geneva, has joined Cliveden Trading. He took up the role of senior commodities trader, having joined the company at the beginning of May. Insa remains a member of the LME’s lead and zinc committee.

Former ArcelorMittal Mining ceo joins Nevsun

Peter Kukielski has been named as the new president and ceo of Nevsun Resources. He replaces Cliff Davis, who will stay with Nevsun for two months as part of the transition process, before retiring. Kukielski was most recently ceo of Anemka Resources from 2014 until this year. Before joining Anemka, he was ArcelorMittal Mining ceo. He had also spent time as chief operating officer for Teck Resources and Falconbridge.

Longhi to retire

Mario Longhi has stepped down as ceo of United States Steel Corp. (USSC), but he will remain on the Board of Directors and serve as an employee of the company, providing transitional support, until his retirement.

David B. Burritt, currently president and coo at USSC, has been elected by the Board of Directors to assume the position of president and ceo as well as becoming a member of the Board.

Codelco adds to Board of Directors

Chile’s state-owned copper producer Codelco has appointed two new members to its a Board of Directors. Paul Schiodtz and Blas Tomic will both serve a four-year term.

Schiodtz, a director of Chile’s state-run energy firm Enap since 2006, will replace Gerardo Jofré on Codelco’s Board. Meanwhile, Tomic joined the Board from being a director of Codelco since 2003.

Executive VP promotion at Nucor

Nucor Corporation has promoted Leon Topalian, vice-president and general manager of Nucor - Yamato Steel Company to the role of executive vice-president. Topalian has served as vp and gm of Nucor-Yamato Steel Co. since 2014.

New gm at Boliden Kevitsa

Peter Bergman has been appointed as the new general manager of Boliden Kevitsa. He joined Boliden in 2000 and has held several positions within Boliden Mines over the years. Most recently, he was acting general manager of Boliden Aitik.
CTRMs trends and innovations

CTRMs software is used widely in the metals supply chain. Duncan Moore asks several international CTRM suppliers about the key drivers for their latest product innovations.

The metal industry and trade faces continual challenges to the way it does business. These include market volatility, limited demand visibility and macroeconomic policy changes within emerging markets. These demands make it increasingly difficult for operations to maintain margins, while also guarding against price risk and counterparty credit risk. Other factors that have to be taken into consideration when trading metals include regulatory changes and a rise in international exchanges launching new derivatives, all of which provide additional opportunities for price risk management.

In order to deal with increasingly complex financial transactions, involving multiple currencies, the industry has in recent years turned to automated systems. Commodities trading risk management (CTRMs) software is now not only widely accepted, but is a fast-growing field. By some analysts’ estimations the total value of the CTRM market will exceed $2 billion by 2020.

Metal Bulletin Magazine spoke to leading CTRM software providers about the benefits of using today’s dedicated CTRM packages, innovations being introduced and the challenges they are having to overcome to meet changing regulations and market developments.

Ayo Sopitan, product management head for metals and agricultural products at OpenLink, says that CTRM is “simply a way to bring sanity to the complex world of commodity trading. It is common for commodity traders to trade multiple commodities across multiple delivery locations, with various quality metrics in different currencies. CTRMs help firms make sense of what would otherwise be opaque operations.”

Sopitan explains CTRM’s particular relevance to metal trading. “CTRM technology is mission-critical for metal commodity traders. A typical vertically integrated commodity market participant is going to have offtake agreements with mines who then produce refined metal that is stored at warehouses. At every point of this chain, it is critical for metal traders to understand their positions, mark-to-market, profit and loss, and to track assays, logistics costs and freight among other cost elements.”

Given that these transactions cover physical, futures, options, swaps, metal leases and loans among other instruments, it is important for metal commodity traders to have a system that is fit-for-purpose to account accurately for all of this activity in an efficient manner.

“Given the amount of value that is being transacted, failure to manage these activities could lead to significant losses,” says Sopitan.

Aftab Pasha, director, CTRM Solutions, Eka, explains that CTRM packages designed specifically for metals and metal concentrates can also address many industry-specific challenges, including maintaining an accurate metal balance, managing payable metal content, capacity planning for raw materials and tracking complex pricing factors for concentrates.

InSight CM®, Eka’s CTRM package, “ensures compliance with industry-standard hedge accounting practices and rules,” says Pasha. “These regulatory solutions also help companies comply with IFRS, GAAP, Dodd-Frank, EMIR and MiFID. Detailed audit logging and access-based controls facilitate reporting of all kinds of derivative trades (both OTC and exchange-based) to regulatory authorities.”

One of the issues that producers of CTRM software are having to deal with is an increase in trading regulations, as Harry Knott, head of product management, Brady Risk & Derivatives, explains: “One of the biggest focuses at the moment is preparing for the MiFID II regulation, which comes into force early next year. There is a lot of work to be done for market participants to understand the regulations and work out what people need to do to be compliant.” Among the issues that need to be dealt with is the concern that “the regulations are not always clear or obvious. There is a job to do interpreting the regulations and understanding what that means for systems and how that fits in with the rest of the software infrastructure,” says Knott.

Inter-operability

Accommodating new regulations is not the only driver of the evolution of CTRM packages. Knott suggests that “inter-operability is one of the
big things that is becoming more essential for almost everyone because there isn’t a single piece of software that does everything.”

Knott says that a lot of Brady’s clients are using its software for their core risk trading activities and using other systems for other parts of their infrastructure. “Increasingly, a lot of what we do is designed to facilitate the inter-relationship of different parts of a client’s IT architecture rather than just try and look at our own software and how that operates by itself.”

Brady is taking a pro-active approach to integrate its CTRM software, designing all of the solutions it builds to be as interoperable as possible by using an open service architecture. In doing so it allows for systems, Brady or third-party, to be swapped in or out as needed while still offering the integration of a single platform.

Knott says the reason for this approach is that “the need to integrate multiple solutions, multiple components into a broader architecture is something that is an increasing need for our clients. The need has always been there, but the technology and solutions are now developing to meet those requirements.”

**Using the cloud**

Seeking ways to integrate software from different suppliers is only one of the issues for developing CTRM solutions. The way in which the package is supplied and used by the client is also changing at a pace with the widespread adoption of cloud-based computing.

Pasha points out a definite increase in the number of customers choosing to use Eka’s cloud-based model. “While we do have customers that choose to use our software in a traditional, on-premise model, the majority of our new customers choose the cloud.

“We also offer a powerful, cloud-ready analytics solution that uses machine learning to analyse real-time data from multiple sources including CTRM, ERP, CRM, market curves and spreadsheets,” Pasha adds. While the popularity of that option is growing the company still continues to offer InSight CM as a locally installed package.

A similar outlook on cloud use is put forward by Sopitan, who says: “OpenLink has many on-premises implementations where the customer hosts our products on their own technology infrastructure. However, the trend is towards OpenLink Cloud, our cloud platform. It combines the latest technology and services with unprecedented speed, integration and real-time risk assessment.” He also believes that more CTRM implementations will be cloud-based than ever before as companies become more accepting of cloud computing.

Another supplier of CTRM packages with experience in the application of cloud computing is Aspect Enterprise. “Aspect’s technology has been built around the cloud from its inception year 2000,” explains Justin Howat, Aspect sales, metals & mining. “The annual sales growth of cloud-based solutions is far outpacing the growth of traditional systems. Trading firms now realise that cloud systems provide a significant amount of savings in both time and money.”

Brady notes the trend towards cloud hosting too. “In the last couple of years, we’ve seen a switch from people having a preference for on-premise and having to be persuaded to take the cloud solution to a lot of people having a preference for a cloud solution,” says Knott.

He says that for many of Brady’s customers the financial savings of using a cloud-based package attracts them. “To manage a cloud solution we take care of all of the overheads of managing the physical infrastructure and all of the IT requirement that go with that.”

Knott also suggests that should there be a problem at any time if the client is using a cloud system then troubleshooting is a much simpler issue. “If they have a problem or question, they have a single support desk to deal with. If they’re looking after their own hardware it could potentially be a hardware, operating system, or database platform problem or a software issue, and that could mean four different vendors or support people they’ll need to contact for a solution.”

There are other advantages to utilising cloud-based packages over traditional on-site installations. Sopitan, for example, says that...
Software for metal trading

OpenLink’s cloud services provide customers with the ability to “rev up processing power and storage” as needed. The ability easily to do so ensures that computationally heavy analytics, data management and processing tasks are not bottlenecked.

Howat is keen to also point out how cloud solutions offer a wide range of benefits to users. “The benefits of the cloud – in terms of cost, balance sheet management, scalability, flexibility, and convenience – are now taken as a given, while all the security concerns relative to those of locally hosted solutions have been thoroughly and conclusively debunked.”

He sees other benefits: “This idea of pay-as-you-go subscriptions with cloud is changing the landscape, not only for CTRM, but everywhere. For example, with AspectCTRM, you pay a monthly subscription and have the latest software.”

Having that ability to easily update software to the latest version has additional benefits. For Eka, it provides a simple solution to up-scaling InSight CM when customers require a change. “It’s a completely scalable solution built upon advanced architecture that has the flexibility to accommodate business growth and changing requirements,” says Pasha. He continues: “It is designed to manage multiple commodities including base metals, metal concentrates, ferro-alloys, steel and scrap. The solution is fully configurable, and customers can slice and dice data as they see fit. It can also be integrated with procurement, treasury, accounting and inventory systems to ensure unified, accurate data across all applications.

Internet of Things

The widespread acceptance of the “Internet of Things” (IoT) and “Industry 4.0”, both of which can integrate with cloud computing, are also providing significant impetus for businesses to move to cloud-based applications.

“Mining companies in particular stand to benefit from IoT applications that can increase operational efficiency by making bulk handling machines ‘smarter,’” says Pasha. “For example, Eka offers bulk handling solutions that use sensors to remotely control equipment and provide monitoring data. These data can be fed into Eka’s analytics solution to provide site operators with real-time visibility into positions and inventory levels across all input commodities and products at all locations. The solution also provides recommendations for performance improvements, enables automated planning, and detects anomalies.”

It is a similar situation with the suite of software packages offered by OpenLink, which have the ability to integrate with weight scales at truck stations to fully exploit the connectivity of devices that are attached to various elements within the logistics chains, such as trucks, rail cars, and barges for logistic tracking purposes. However, Sopitan believes “The future of IoT in CTRM is yet to be fully realised. When it is, we might see ores getting assayed by connected devices that send results to both sides of the transaction for immediate umpiring, for example.”

Knott says that integrating logistics within a CTRM package by utilising IoT is an area that Brady is exploring. “One of our connected solutions is for recycling companies allowing them to automate the tracking of containers at scrap processors. You have a truck driver with a hand-held scanner that they can swipe the container with and we can track that data. It is a very useful way to use what is now standard technology. It can be used to improve the profitability of the business.”

Knott continues: “Those sorts of things are viable uses of Industry 4.0. We have a similar sort of thing on the scrap market with hand-held inspections. You can have people going to a scrap yard and use the camera on a phone to photograph a pile of whatever has come in, and that allows you to more easily track what’s being delivered and make adjustments to your expectations of quality and quantity of material coming in. We have different components in our package that make that possible and integrate with commodities trading and the metals processing supply chain.”

Eka is also looking at ways of gaining the maximum benefit from the IoT. The University of Adelaide is using drones to take hundreds of stockpile images in just a few hours, completing in one day what would typically take a piloted aircraft or individuals with hand scanners a week or more. Those images are then imported into Eka’s 3D Stockpile Manager, which creates an accurate 3D volumetric stockyard model. This information can then be incorporated into CTRM solutions to ensure the seamless flow of accurate information throughout the supply chain, eliminating the need to manually duplicate data entry in multiple systems, maximising productivity.
A bespoke trading and risk system

Users of electronic trading systems expect them to run reliably and seamlessly while providing data at a click of a button. Gavin Parker, chief operating officer of Sucden Financial, tells Richard Barrett about the constantly evolving systems that the LME ring dealing broker firm uses to satisfy them.

Clients, traders, brokers, exchanges and regulators have high expectations of the digital systems that facilitate their work. Providing the network architecture and software needed to meet today’s derivative trading needs is a high-tech business.

The London Metal Exchange, for example, lists nearly two-dozen independent software vendors (ISVs) that have passed LME conformance tests for order routing applications connecting via the LMEselect application programming interface (API).

Exchange members and their clients may choose to access LMEselect via member-sponsored ISV platforms. “Client traffic passes through an ISV pre-trade risk engine endorsed and fully controlled by the sponsoring member’s compliance team,” the LME explains.

Gavin Parker has worked for ISVs, but for the last ten years he has been with LME ring dealer, international derivatives and foreign exchange broker Sucden Financial in London. As chief operating officer, he and his team are responsible for the company’s own electronic trading system – STAR, the Sucden Financial trading and risk system – which it started to build 16 years ago, having previously used only ISV systems. Today the broker has a team of over 20 internal project and development staff managing its in-house trading and back office systems, supporting hundreds of STAR users.

“We also support a number of ISV systems for API and some screen traffic,” Parker explains. “We have our own memberships and so go directly to some markets – order routing through other brokers for other markets,” he adds. CQG and Patsystems, for example, are among half-a-dozen ISV electronic trading solutions that Sucden Financial offers its clients.

Stability and reliability are two key trading platform requirements stressed by Gavin Parker, coo of Sucden Financial

Making connections

Parker draws on a whiteboard to show the main links between the trading and back office systems that connect to multiple exchanges and clearing houses.

STAR has connectivity to the LME, CME and ICE, amongst others, and also links into foreign exchange (FX) markets, accessing multiple FX liquidity providers via an FX aggregation engine.

China has software vendors of its own, including Esunny, Sharp Point, ATP and TradeX. Parker says that some Chinese ISVs are not connected directly to exchanges, although some of them have started to, but they do conform to various standard ISV APIs. So customer \( X \) with a screen, will link in to an ISV to execute orders, such as on the LME, through Sucden Financial’s membership of that exchange.

“The SHFE is a closed market outside China,” Parker reminds. “But customer \( X \) is a local, who can go through Chinese broker \( Y \) to access the SHFE and thus get the SHFE/LME arbitrage.” An ISV’s access to CME enables arbitrage between CME and SHFE copper prices.

Parker says that STAR can cut some of the steps out of the way. A user can use a PC via the internet to access a STAR server, in a Hong Kong or London data center.
Software for metal trading

centre, for example. That in turn connects with the CME, ICE and the LME. Or it can route via an ISV to HKEX, SGX or Tocom for example.

A dynamic legger, which is STAR’s automatic spreading tool, is provided so that people could trade the arbitrage between the CME and the LME, for example. STAR is written in Java, so to use it the trader user downloads the Java clients on their machine at the “front-end” of the network.

Reliable routing
A user’s PC in China will connect up in Hong Kong to one of two data centres there for local trades routed through to the local exchange, rather than through London, where Sucden Financial uses another two data centres. Each data centre has multiple servers, which all do slightly different things. It does not matter if a server were to fail because work is balanced across multiple servers and data can be simply rerouted through them according to need, including maintenance.

“It’s what they call self-healing architecture. So if a box fails, or an entire data centre fails, or a communications line fails, it just doesn’t matter,” says Parker.

The STAR system runs on Sucden Financial’s own dedicated hardware, rather than using virtual machines. “For something as critical as your own in-house trading system, we wanted to totally own it, not outsource. We buy the communication lines and internet circuits. We have our own in-house software developers and back-up data centres,” Parker stresses.

STAR advantages
Why did Sucden Financial choose to build its own trading platform? Its straightforward nature is one feature that the broker highlights. It is said to be easy to use and the fact that it has been developed in-house means that it can be tailored to an individual client’s needs.

Parker says that there is always an argument over whether to buy versus build. An advantage of building has been the ability to design and configure to the exact requirement of STAR’s users. “If a customer says they want the spreading tool to be adjusted, we can do it... You can do what the customer wants,” he summarises.

Bid price, offer price and volume are standard items on a screen grid, but the way they are displayed and any additional information presented can be customised. So someone using a Chinese ISV system, can connect via Sucden Financial’s infrastructure to get orders handled in the way they want.

“In a way, there is an advantage to having multiple platforms, because if, for example, the one system goes down you’ve still got other options,” says Parker.

Is there a plan for STAR to have an open API too? “Yes, but a big problem is challenges around market data. If you speak to any broker, they’ll tell you that it is frightening the amount that exchanges charge for market data,” Parker notes.

Risk and stability
Risk management has become a growing priority in a world of ever tightening financial sector regulations.

“A lot of electronic trading systems will have lot limits, for example,” notes Parker. “We can add net trading limits. If we want to we can SPAN every single trade through a SPAN engine. It takes milliseconds to do it — so it’s not a low-latency system that a high-frequency guy would use — but for a click trader it is sufficient. Our risk management is better than any other ISV I’ve worked at,” Parker declares. “It really is a very strong risk system.”

Parker says that STAR is also considerably less expensive than some large ISVs platforms, saying that it can come in at as little as 20% of the cost. “Will our system have all the bells and whistles of something like a large ISV’s electronic trading platform? No. But then do our customers want all of those bells and whistles? On the whole, no, but then we also offer ISVs.”

Available bandwidth remains an issue for traders in parts of the world. “In STAR we have spent a lot of time compressing and consolidating data. If you have a customer sitting in an area that has extremely poor internet connectivity and he trades on multiple exchanges, market data is what takes up all the bandwidth, especially if he has market depth,” says Parker.

He says, for example, that many of their customers in China say that Sucden Financial offers the most stable system, and some use multiple brokers. “From a stability point of view, we believe we have the most stable system,” Parker declares.
Within China, Sucden Financial provides access points in Shanghai and Guangzhou, connecting via ‘the cloud’ with data centres in Hong Kong and London.

“We have both land and sea circuits going from Hong Kong back to London, with the two data centres here as well. We spend quite a bit of money every year on trading architecture: data centres, high-speed communication lines. Even though speed is not massively important for a click trader — over fixed lines they are much more stable. Each of these circuits — for example from Hong Kong to London — go on a protected path. So if a fishing trawler picked up a physical sea cable and snapped it, then information will automatically go via a secondary path.”

Parker says that network stability remains one of the big issues in China. Although he admits that Chinese arbitrage traders are becoming a bit more latency-sensitive now, he says that click traders over the internet still prize stability over speed.

“Software is also very important. We can squeeze the market data down to get it through a smaller pipe,” he reiterates. “Other systems we’ve used in the past are not geared towards ‘compression and stability,’” he adds.

He stresses that software determines what a customer sees on screen, but that the architecture he described is also very important. “They kind of go hand-in-hand. The software handles an order, but the network architecture gets it to the exchange.”

**Future development**

What is on Sucden Financial’s functionality wish-list for the future?

“At some point we would like to have a central order management system for all our order flow. With individual systems, there is a way you can do it, but then it becomes much slower,” says Parker. For example, if somebody’s office in Germany uses STAR, but has another office in Hong Kong that wants to use an ISV, and another office using another different trading platform, those are all separate systems. “So where is the central order system?” he asks. “We risk manage them across the three and we can move the risk and the available cash around, but there is no central order management system.”

He explains that Sucden Financial has consolidated post-trade risk management and comprehensive pre-trade risk management, but the overview is in Sucden Financial’s back office system. He says that it would be good to have a central order management system for the overview, but that credit lines are another factor to consider.

“It would be nice to have your own matching engine as well, but most customers want to trade an official LME contract,” he notes. He says that a lot of banks have their own matching engines. “How they make decisions on whether to route through to the exchange or match up internally I don’t know. We’ve thought about it and looked at it, but our customers are trading on LME contracts, whereas others are trading OTC.”

**Regulatory drivers**

Looking out for unusual trades or unexpected volumes in trade amidst the ‘noise’ of trading is a requirement, Parker explains. Whether using ISV or in-house trading platforms, the regulation requires unique Legal Entity Identifier (LEI) numbers. “Is it a hedge or speculative trade: you have to identify all these things,” notes Parker.

Parker explains that all the trade flow feeds into Sucden Financial’s proprietary back office system. “But before then we will be taking feed for the LME and ICE, and any other European markets that we need to include, into a ‘big box’ to monitor order flow, and any trading anomalies. A malfunctioning API, for example, will be flagged through a warning system.” Sucden Financial has a 24-hour risk team, with its London and Hong Kong offices covering the markets it trades.

He says that the revisions of MiFID and EMIR — with the level 3 revision of the latter due to go live on 1 November, and the second revision of the former at the beginning of January 2018 – plus commodity position reporting and LBMA reporting due next year have all come together in quite a short period of time. “The finalised rules for MiFID 2 and EMIR level 3 were only clarified at the beginning of this year,” he adds.

He says that Sucden Financial will need to update its own system rather than relying on an ISV. “We have made nearly all the changes to STAR to ensure that it’s fully compliant.” He says they are waiting to hear on what timetable some of the ISVs will be updating their systems to comply. In addition, the time limit for matching for trading on the LME floor is decreasing from 30 minutes to 10 minutes from January 2018 – “another thing we have to do,” notes Parker. Sucden Financial is looking into developing a tablet application to achieve this.

**Future trends**

What of the more distant future? “There is more pressure on looking at algorithmic traders from a regulatory point of view, so it will be interesting to see how that market changes... We’ve never looked at proximity hosting co-location because we knew that the regulations were changing. The regulators are looking closely at the high-frequency traders,” Parker observes.

Parker says that STAR has always got more than enough system capacity. “We monitor it for us and for our customers. But an ISV might on-board a high-frequency trade customer, which we wouldn’t know about, that could have the potential to overload their system.” However, he concludes that Sucden Financial applies a ‘know your customer’ approach that ensures its system is ready for each new customer.
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Digital trade documents

Interest in the digitisation of trade documents has climbed. Richard Barrett catches up with Bolero ceo Ian Kerr for an update on the progress he sees in electronic documentation.

Bolero ceo Ian Kerr says that there has been more interest in trade digitisation over the past year, driven in part by interest in blockchain technology.

Electronically recorded and transferred documentation is an alternative to traditional paper documentation that is now increasingly being taken up by large international miners, trading houses, steelmakers and their financiers.

Kerr notes that Bolero already has some metal majors in the Bolero digital trade document ‘club’. They include Norilsk Nickel, which joined earlier this year, Vale and Codelco. He says that Norilsk Nickel’s trading arm in Basle, Switzerland, requested a proposal from Bolero after canvassing its own markets’ interest in using digital trade documentation.

The factors in favour of exchanging legally binding digital documentation – such as letters of credit and bills of lading – between sellers, buyers, banks, insurers and shipping companies are unchanged. Speed of transfer and security are two of the key advantages.

China is a particular focus for Bolero, which has opened a new office in Shanghai and has added the privately owned China Minsheng Bank to its client list. The bank plans to reduce transaction times.

In one recent transaction Bolero was instrumental in the swift transfer of Letters of Credit for the purchase by a Chinese client of a $10 million purchase of iron ore from an Australian miner.

Another transaction, for the purchase of plastics for an Italian bottle manufacturer from an Indian supplier, was completed in less than 24 hours.

Blockchain

Blockchain (or distributed ledger) technology is about delivering the accurate, reliable and secure recording of the transfer of ownership of data in a way that cannot be interfered with. Kerr notes that while some big banks have supported recent proof-of-concept work on single transactions using blockchain, demonstration of its scalability will be needed for it to achieve widespread commercial use.

He points out that the use of Bolero has already reached an “industrial” scale. “It’s not about the technology. It is about the end-to-end process – clear trading transparency and underpinned by legal certainty and authenticity of documentation.” Bolero has a user enrolment process to ensure authenticity and a rule book to ensure legal certainty.

So while Bolero has distributed ledger attributes, including encryption, digital certificates and signing, it also has a matching engine to ensure that the key attributes of documentation presented match up. “Bolero has the rule book, the experience and an established network of trade banks,” Kerr summarises.

Inclusivity

Kerr notes that the International Chamber of Commerce is also moving towards the use of digitised trade documents.

Taking part in a rigorously managed network linking together trading companies with trade finance banks is also a benefit for small and medium-size enterprises that may otherwise struggle to win attention and finance from big banks with regulatory requirements to “know your customer”.

Kerr sees evolution towards a “network of networks” for international trade and trade finance. An integration with an invoice-processing platform that provides confidence for both settlement or finance is part of that, providing a streamlined and secure service.

Outlook

Kerr says that there has not been as much progress on regulatory and customs drivers towards the use of digital documentation as Bolero would have liked to see over the past year, with some countries still wanting physical paper documents at their ports and land-borders.

He says that, despite 2016 being a challenging year for international trade, the number of billable transactions taking place on the Bolero platform increased by around 13%, to 35,000, during the year.

Kerr says that Bolero is continuing to build out its e-finance solutions, explain the benefits of e-transactions and pursue opportunities for further growth. He notes that China is still a growing market and says that the fact that Letters of Credit are widely used in the country to cover risk makes the business case for using the Bolero platform particularly strong there. He adds that a national drive towards digitisation in India means that the company is also busy with a number of large corporations there.

Kerr concludes that the likely growth in use next year of “more industrial-strength blockchain applications in trade and trade finance” bodes well for future use of digitised trade documentation.
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Digital revolution

International metallurgical plantmaker SMS group has placed digitalisation at the core of its business strategy. Richard Barrett interviews Harald Rackel, SMS group managing board member and head of digital solutions, to discuss progress and the future.

Digitalisation is at the heart of SMS group’s strategy to nurture its long-term relationships with the international steel and metal producers to which it supplies metallurgical plant.

The international plantmaker’s directors recognise that the fourth industrial revolution – or Industry 4.0 as it is otherwise known – offers many opportunities, but also carries some risks.

The opportunities are a major component of the overall group mission to be a “leading partner in the world of metals”, declared by its chairman and ceo, Burkhard Dahmen, during the company’s annual report press briefing in Dusseldorf in mid-June 2017.

“The goal is to advise and support customers with a focus on their requirements in metallurgical plant construction plus electrical and automation systems as well as service,” said Dahmen. “This will pay special attention to today’s rapid changes in working practices in connection with digitalisation and Industry 4.0,” he added.

SMS group has an established capability in digital systems through its provision of automation and control systems with its plants. It has also developed virtual reality and augmented reality systems to demonstrate and test its plant designs and train operators in advance of the commissioning of their actual physical plant: part of a ‘plug & work’ concept for new or modernised plants.

Harald Rackel, SMS group managing board member and head of digital solutions, has been with the company for over 30 years. Starting as a mechanical engineer and managing projects for about 10 years, he became a deputy divisional head for the mechanical engineering area, before switching to electrical engineering in 2007. He was head of the electrical and automation division until 2013 – a period in which the company transformed from mainly being a machinery supplier to a provider of complete plants including the electrical and automation technology.

“Through digitalisation, we are offering the idea of how to produce better on your plant – more economically, with better quality and less material consumption,” says Harald Rackel, SMS group head of digital solutions.

“The next step is that we go into digitalisation,” says Rackel. “That means there is a lot of data available – partly permanently available, partly temporarily available – and the question now is how to utilise that.”

He genuinely sees it as being an industrial revolution. “If I go back to when electrification took place, everybody knew exactly what to do with electrics – but we are now coming to a new point with digital information. That is the next revolution, but nobody exactly knows what to do.”

He is sceptical about anyone who thinks they already have all of the answers because he believes that only 10-20% of what the benefits of digital intelligence could be in the future can be envisaged today. “If it’s a revolution, we are doing things that are completely new, with new aspects, and we have to see how we can use these new aspects in the future,” he says.

Defining digitalisation

Rackel confirms that Industry 4.0 and digitalisation are terms for which there are many different perceptions. “We put a lot of stickers on different items today in the sense that ‘This is Industry 4.0. This is digitalisation.’” But in his opinion, some of the things labelled like that are actually automation or robotics. “Right now, since everyone wants to be in a hurry and everyone wants to be the first, whatever looks like digitalisation or Industry 4.0 is getting a sticker to say so.”

He explains that sometimes it is just a lot of information, slightly more intelligent programming or a little more collecting of data, which he says is not digitalisation or Industry 4.0. “We should keep that in mind,” he stresses.

He has spent the last three months touring the world to get a global view and he shares a simplified summary of his
conclusions, based on his conversations with experts from various locations.

“In the USA, it’s about big data. I just collect information from sensors. I don’t need any specific knowledge about the machine. I just look at the data and I know exactly what’s going on. So I would call it big data and the deep learning that comes from that.

“The Germans start by analysing what we could do with the data for use by a machine or a plant, and we start thinking about what could be the product of the future. It’s a more engineered process.” He says that is both in terms of new products for manufacturing plants and the products which the plants themselves produce. “I want to improve the product quality, I want to improve the machine life or availability. Then we start to think about the steps that will deliver a better machine — longer lasting, providing better quality — but we approach this as engineers.”

He says that in east Asia digitalisation is mainly associated with ‘Kaiseen’ — “Getting ever better through iterations — and robotics.”

Finding focus
SMS group has two focal points for digitalisation: one is on the external market and the other is internally on production in its own plants.

On the latter, Rackel says that the business is aiming to answer the question: “How can I improve my value chain through digitalisation internally, and my manufacturing process for such plants?” While the company is looking into this, he says that is its second priority. “Right now, we want to be fast in the market and we want to be fast with our customers. So we have been focusing on our customers’ needs in digitalisation or Industry 4.0.”

He points to the mission to be leading partner. “That means that we have insights. I should not ask my customer ‘What do you want?’ I should ask him ‘What is the problem that you want to overcome?’”

Steel and metal producers will often have their own ideas about how to deal with production problems or plans, but if they are willing to describe them to the plantmaker, “Maybe I have some different information available about how to overcome his problem even more elegantly,” says Rackel. “I call that a fundamental insight into the customer’s needs.”

He explains that is driving the group’s work on digitalisation. Rather than providing the best piece of machinery on the basis of what a customer asks for, instead “On the basis of understanding what he is hoping to achieve and produce by buying it.”

Joined up thinking
By way of illustration, Rackel gives the example of joining up what at present are three independent planning circles, for quality, plant condition and production planning.

Each has its own key performance indicators (KPIs). Those for the first, quality, are fundamental in choosing appropriate technology. The second, plant condition, may be broadly known, but not in detail. KPIs for that include minimum inventory of spares and high plant availability. The third, production planning, involves incoming orders, financial and operational factors.

“The major point is that we want to link together all these independent planning circles with one database in the middle,” Rackel explains.

Poor plant condition may prevent production of the right product and may not achieve the quality needed. At present, a plant operator will make sequence plans based on average values of plant parameters, such as casting speed.

Across a large integrated steelworks producing about 10 million tpy, Rackel says that as many as 600 planners might contribute to overall production planning, taking into account each of the different processes, including melting, casting, hot rolling, cold rolling and coating. “They are planning on average figures,” he stresses. “The moment that they want to go from average to actual figures, they may find out that the plant is not in the right condition or might even be down,” he notes.

Depending on actual current plant status, a decision might be needed to stop the plant, to get it back to the right condition, or to drop production of that product and reschedule its production for a later period after a maintenance shutdown. The idea is that if the three planning circles are interlinked, you will always know the condition of the plant, know what quality can be achieved with it, and be able to plan production accordingly.

In the past, each process plant at a large integrated steelworks had its own individual automation system. “They do not usually communicate with each other. Only very restricted data is going from one to the next. Production planning is usually overlaying all of these — that is one system, and the manufacturing execution system (MES) would be part of that as well. You know what quality has been produced in the automation system in the respective area,” he explains.

“If you go another step, now we have realised an intermediate layer collecting all of the production data and each of these automation centres sends their quality information to a separate server. This provides an opportunity to define rules. That is still not Industry 4.0, but it is a prerequisite. You have to have the data of the different information systems in
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one location, otherwise you cannot achieve any deep learning or machine learning.”

A traffic light system is applied at each end of the process step. It shows green if everything is good to proceed, yellow if there are some figures that do not match specification and a subsequent check on the quality is needed, or red to indicate that something has gone wrong and the product cannot continue through the remaining process steps to the finished product.

“This is the first time that all of that information will be correlated. That correlation is a manual process in the steel industry today.” So, at present, if there is a problem at any given point in the production chain, a human call has to be made from one part of the plant to another person upstream to get essential information about, say, a particular coil. By having quality data centralised with visibility for all relevant plant staff, such calls for information should be eliminated.

“Everyone can see what the history of a coil is that is currently passing his particular point in production and that is the first time that he can easily observe the quality of the product.”

Big data

While the concept sounds straightforward, gathering the data required and processing it to achieve an accurate big picture of plant condition is far from trivial.

“We have a lot of sensors in the plant and today we are sampling most of these at a rate of milliseconds. So we are producing a huge amount of data,” notes Rackel.

It might be as much as 10 TB per month of data for a single plant’s condition. Today, data are typically stored in each individual automation system for four weeks and then overwritten with new data. Consequently, analysis looking back any further than about a month has not been possible in the past. Some quality data for any particular product, say a steel coil, travel with it, but the data about the exact condition of the plant at the time it was produced are thus lost after four weeks.

The idea now is to collect the data and structure it. “Structuring means that if I define a certain value as ‘good’ within a certain range, and it stays the same throughout the whole length of a product, then I can store just one average value,” he explains. “If it is running out of range, then I have to monitor exactly what happened. I also have to correlate that position where something happened to the position on the strip. So only if I can correlate an event with the exact location on the strip material am I able to track deficiencies and to say that was a wrong temperature or speed setting that caused the problem.”

In the past, if there was a problem it would be investigated there and then. “Now the idea is to constantly collect the data, putting in all the quality data, finding all the defects and correlating all that with the condition of the mill.”

Progress to date

Rackel says that SMS group already has a system that collects all of the relevant data for quality assessment, implemented with rules agreed with the customer. “That is more or less a digital quality-handbook, which would have been on paper in the past, but is now replaced by automatic measuring. Now we are coming to a position where we can correlate these data and we can use it. That would be one area for artificial intelligence (AI).”

There might be ten signals that are important contributory factors of relevance to a particular defect. “I will correlate these ten parameters and then I could find out, for example, that whenever a certain alloy is close to the minimum level, then a certain defect will happen.”

Based on that, rules could be changed and, going back to the process, the minimum amount for that alloy could be increased to ensure that particular defect would not occur.

“So, in summary, one idea is to avoid defects and the second is that, knowing better what the condition of my plant is, I could structure my production scheduling in a way that I could produce material with less defects.”

For example, automotive exposed quality coil production might need to be avoided at the end of a particular rolling campaign since certain components would be worn out. Such scheduling needs to be worked out manually as of now, but in the future that information could be interlocked with intelligence in the computer to optimise production.

The final outcome would be to increase the plant’s yield. “Now I come back to the KPIs of my customer,” he says. “I increase the yield. I produce less scrap. I do not process substandard coils, because I stop processing them at an earlier stage and before they are processed into a finished product. I know exactly what my quality is and if somebody calls me and says they urgently need a particular product, I have all the data on my stock and how it was processed so that I can find the closest match to their needs.”

The system’s ability to be able to match up actual stock qualities to different customer requirements means that even less material is scrapped.

“In summary, we try to meet the customer KPIs by collecting the data, interlinking it with the actual material produced, and try to provide them with a powerful tool that can increase the overall.
efficiency of the plant. That would include energy reduction, increasing yield, better quality and higher prices for less defects.”

**Further advantages**
The marriage with computer modelling of such detailed information about the impact of a plant’s condition and process parameters on the products it makes will also enable the investigation of how changing them might enable the production of new materials.

“We will have a digital twin,” Rackel says. “With that you can put the data collected in to the digital twin and see the outcome. You could develop new material traits for the future and you could predict what settings would be needed for torque, and the effects on machine wear if you are making a much harder and sophisticated material.”

All of that can be predicted by digitally modelling the real machine to show what would happen if running with a different kind of material.

SMS group also has a microstructure model to analyse what is happening as material is formed during different process steps, such as hardening and temperature effects. “We are running these simulations as well and we can see how good the simulation will be.”

If material behaviour is successfully captured and modelled in one plant with a particular geometry, condition, operating technique and schedule, it should be reproducible on another.

**Complete optimisation**
Beyond keeping a plant in the right condition needed to produce the range of products desired, plant owners also have a natural interest in minimising operating costs and maximising the longevity of their machinery.

Routine maintenance work is usually done at regular intervals, with decisions being made about the particular work to be done about a week before it happens. But if the condition of a plant is continuously monitored, the periods between maintenance shutdowns can be shortened or extended according to need.

“You would optimise the shutdowns,” Rackel explains, in co-ordination with the optimisation of production, quality and inventory. “If I run the plant in a certain way, then I can achieve less wear and I can produce more tonnage with the same equipment. That is the potential. You could easily envisage a 5-15% saving if you could run everything optimally.”

Even scrap and alloy purchasing could be optimised. To make particular products, “What you could do is run a calculation to compute the cheapest combined cost of scrap and alloys on the basis of which type of scrap you choose,” he says. Real-time analysis of different scrap and alloy price combinations that could be used to make particular products at a given time would enable the most cost-effective choice to be made.

**New business model**
To what extent will all of this be bespoke or generic?

“We are only starting at this point in time, so I think that there will be much more coming down the road,” Rackel says. “It has to be a tool. You cannot develop such a software solution for one individual customer. You have to think about a platform — that is one of the keywords in digitalisation. You have a tool platform, where you collect the data, and then you have a set of possibilities to structure it for each individual plant. That means we have to develop the software, which will be based on many customers using it.”

Upgrades with additional functionality will be released each year, based on the ideas and problems coming in. “It should not be a specific analytical method for one customer only,” he stresses. “We should find algorithms, rules and tools that we can easily implement in a general start and then these will be adapted in the future, based on operational experience.”

He sees the business model changing, drawing a parallel with the way in which aero-engine manufacturers tend to provide, and charge for, an on-going ability to fly by monitoring and maintaining the turbines they supply in use, rather than simply selling them as a piece of capital equipment.

“We started as an OEM — a great supplier of plants — getting and executing an order, receiving an acceptance certificate and then leaving the plant.” Now, SMS group already agrees service provision for many of the plants it supplies. “I remain in contact and I have to regularly supply the same service at the same quality level,” he reminds.

“For the next stage, through digitalisation, we are offering the idea of how to produce better on your plant — more economically, with better quality and less material consumption — and I have some software to analyse your process and I tell you what to change to get out the same products, or better products, in higher volume and with less spare parts.” That includes the advice on the frequency and type of maintenance.

“If we come to the digital time, there will come a point where we only have to provide a software solution for which we charge more or less, and the customer pays on the benefit.” In other words, SMS group would run the plant data through its software, advise the plant owner what to do next and be rewarded accordingly.

How many companies will actually be willing to buy in to that model?

“It’s coming up now,” he says. “Big River Steel [Arkansas, USA] is our most prominent project where we are providing expertise and have already installed these systems. We have full access to all of the data. The customer wanted this and he has approached others with AI expertise as well.”

In summary, the future model is for a customer to provide the data to the plantmaker, for the plantmaker to tell its owner what it could do better, and then be rewarded a percentage of what the plant owner gains by implementing the advice.

“Without data analytics, this will not work,” Rackel adds.

The idea of payment by plant performance has been around for some time. While some US producers have embraced it and there has also been some interest in it in Russia, Asian clients have
Software for metal production

been reluctant to adopt the idea. What are regional attitudes to the concept like now?

“Two years ago, I would have said that there is no-one in the world who would share his data. Meanwhile, we’ve found companies showing all of their run data to us — even putting them in the cloud,” says Rackel.

He thinks that data sharing will become more open. “I do not know where this will end up, but I think — and that is what I learned in Silicon Valley — to exchange information you have to be open on the data and you cannot invent everything by yourself.”

He says that there will be small companies in the market having certain niche products in automation or analysis, and that it is unrealistic to work in a vacuum. He reminds that the success rate for inventions is about 1 in 10. Backing just one new technology carries inherent risks. Remember the lesson from the triumph of the VHS videotape format over Betamax, he warns.

SMS group bought a majority share in QuinLogic, based in Aachen, last year. It creates software for quality management in the steel, aluminium and paper industries. Some of its products have already been used for Big River Steel and for Shandong Iron & Steel in China.

“The point is doing partnering and doing it with a few companies,” Rackel stresses. “That means being open: I will not have proprietary solutions for everything. That means if I want to exchange data with my customer, I cannot choose the platform.”

With those thoughts in mind, he thinks that the existing idea of having an entire plant automation and control system supplied by one large electrical engineering company is becoming outdated.

He draws the parallel with smartphones using a standard software framework that is applicable globally, such as Android or iOS, but with multiple application providers. He also sees the power of widely distributed small computers by contrast with centralised computing capability.

“The definition of completely standardised formats of communication in the automation industries has yet to be resolved, says Rackel, but there are programmes, funded by the German federal government for example, looking at a common language between engineering, execution and data exchange in automation.

“There will be a lot of changes and I believe it will be open. Like the internet, you have the HTML format, which works in the USA, Europe and Asia, and there will be something that works for industry in the future — maybe in five or ten years.”

Artificial intelligence

SMS group is capturing ideas for digitalisation across all of its divisions, departments and subsidiaries by working in a network as a team.

The equipment range that the group supplies runs from scrap handling and melting, through casting and rolling, and on to galvanizing. If there are 8-10 different production units on an integrated steelworks site, for example, they may generate over 100 TB of data per year.

“The question that no-one has really been able to answer up to now is whether domain knowledge is an advantage.” He says. “For example, we know about rolling. Other large general IT and software companies have lots of knowledge about AI, but can they do optimisation without domain knowledge as well as we could do it?” he asks.

“Right now, we say that if we use AI plus domain knowledge, we can provide more benefit than others. That is our strength and why we want to go in, because the worst fear is that a company like Google could do as good a job as we do. They would do everything and we could become just a supplier of ‘dumb’ steel machinery.”

The SMS group works with universities, organisations such as the VDMA (Germany’s Mechanical Engineering Industry Association), other public organisations and consultants to expand knowledge. The University of Aachen, for example, has an Industry 4.0 ‘factory’ for textiles. It is a different industry, but provides an idea of how a digital plant could work, Rackel notes.

A common good

“As I’ve said before, we are not alone and there are others who have invented certain things, and we should not be too proud to use things that are available on the market that have proven their functionality. That makes speed and partnering important,” he stresses.

“We have an open sight of what is available on the market and we should be fast and decisive and we should utilise whatever is available at whatever level. It is clear that we will need AI. We have it partly in-house, but we will strengthen that.”

Despite different international attitudes, he says that a time will come when everyone will share data because it is of benefit to everybody. “That is what we mean by an open platform... It has to be an exchange, wherever that may be — whether in the cloud or another environment is not important. What is important is that everyone can utilise the data with his proprietary systems. That means we have to discuss [standard] formats.”

He says that digitalisation goes along with the network effect. “That means whoever is on the network has a benefit. So, if I can create an advantage for someone to be on my platform, or my block chain or whatever else, then he or she will stay on the platform and that gives me a certain benefit.”

Both service provider and user are getting a benefit from the sharing of data. “The point is to be fast and to offer the attractive platform(s) on the network.”

He concludes that every day new facets of the picture are emerging, which are very encouraging for the future of digitalisation. “On the one hand, there is a lot of fear about what will come in the future and what all this data means for cyber security, but we are convinced that we have to go ahead. The key interest for us is being the leading trusted partner of our customers. That means he must trust that we will not give his information to somebody else and that we have to provide a service that is better than others. We have to provide some solutions that the customer has not thought of, and then we would be good.”
The next industrial revolution – the digitisation of manufacturing – has started to make inroads into the metals industry. Myra Pinkham discovers how far it has developed and how far it is likely to spread.

The latest industrial revolution is commonly known as Industry 4.0, but is also strongly associated with the Internet of Things (IoT). Yet just how significant is it? According to John Lichtenstein, managing director of natural resources for Accenture Strategy, it could result in a “quantum leap” in productivity and efficiency, helped along by the convergence of a number of new digital technologies.

While the impact varies greatly, given that not all companies are starting at the same level, Accenture Strategy has estimated, based on modelling it has done at a number of metal production facilities, that companies could expect to see approximately an 11-15% improvement.

“This next phase of manufacturing goes beyond the automation and robotics that were part of Industry 3.0,” says Matt Meyer, vice-president of digital innovation at Kloeckner Metals Corp, the Roswell, Georgia, based subsidiary of Germany’s Klöckner & Co. “It involves this whole interconnected data universe where you don’t just have automated machines, but you have machines that talk to one another.”

Tom Garinis, a senior advisor for Deloitte Consulting, describes this as a marriage of information technology (IT) and new operational technologies, including analytics, 3D printing or additive manufacturing, robotics, high-performance computing, artificial intelligence, cognitive technologies and augmented reality, which have all become more prevalent in recent years.

This, he says, is part of what has become known as the “smart factory” or “smart manufacturing.”

Industry 4.0 is bringing further automation and digitisation to the metals industry

where companies optimise their maintenance spends and improve asset efficiency through such things as predictive maintenance of equipment, pieces of equipment communicating with each other and new forms of human-machine interfacing.

Not all of this is brand new, observes Stefan Koch, global metals lead for SAP SE, Walldorf, Germany. “The metals industry already has a lot of automation and digitisation up and running. Predictive maintenance is already being done at many steel companies.” But, he admits, they have much further to go. “Industry 4.0 isn’t a project. It is a journey that the industry is embarking upon.”

It is a long journey, says Chenn Zhou, the founding director of both the Steel Manufacturing Simulation and Visualization Consortium and the Center for Visualization and Simulation at Purdue University Northwest, pointing out that it involves a lot of things that are not currently in widespread use, including machines that are able to communicate with each other and collection of data using smart sensors. There is also a need for artificial intelligence (AI) or deep machine learning to have smart analytics.

Many observers suggest that the industry is still in the very early stages of that journey. “I would not describe the metals industry as an early adopter of Industry 4.0,” says Mike Tomera, US metals leader for PricewaterhouseCoopers LLC, who notes that according to some of the surveys that PwC has conducted a number of metals companies are still sitting on the side-lines waiting to see how things are going to play out.

That is not surprising, Richard Oppelt, Accenture Strategy’s principal director says, given that the metals industry tends to be fairly conservative and fairly prudent about its capital investments. One problem has been that Industry 4.0 and the IoT tend to include a certain amount of uncertainty that the company will be able to achieve the desired results. “There isn’t the same direct line to a return on investment as there is for putting in a new piece of equipment, so a company’s degree of openness is a function of having the profitability to be able to do some experimental things.”
“The biggest challenge isn’t the technology,” SAP’s Koch maintains, but the risk that comes with innovating and doing something that has the potential for being really disruptive. “It is a big step which requires a big commitment from the top level management of the company.”

That does not mean there has not been any movement though. Tomera says some inroads are starting to be made when it comes to the addition of connected devices, IoT and connectivity of plant, including the addition of sensors to help with safety and quality control.

“Whether we like it or not this is already happening in several industries and it is slowly occurring in the metals industry even as we speak,” says Carlo Travaglini, director of technology for Gerdau Long Steel North America.

“There might not be a whole lot of receptiveness by the industry yet, but it is going to come,” Travaglini adds, noting that one of the beauties of the Industry 4.0 revolution is that all of the necessary capital investments can be retrofitted into existing operations, making it more affordable and achievable.

This, he says, is very different from the last revolution — the automation revolution. “You really had to change your manufacturing process completely, installing totally new equipment when adding programmable logic controllers, robotics and other automation tools. That doesn’t mean that achieving Industry 4.0 is an easy task. It isn’t,” Travaglini says. “But I think it is possible for us to make our factories smarter without having to redesign them completely and that’s a good thing.”

The metals industry has a way to go, but more companies are seeing the value of going down this path. In Industry 4.0: Building the Digital Enterprise, PwC reports that digitisation is moving from being “nice to have” to something that is now seen as being vitally important for differentiation. Metals companies surveyed by PwC said they plan to invest 4% of their annual revenue in digital operations solutions over the next five years with 62% of those surveyed saying that they expect to reach an advanced level of digitisation within the next five years, with 55% expecting that to include horizontal value chain integration with customers and suppliers.

“We are still in a phase where we are assessing opportunities and focusing on the easier wins,” says Travaglini. He adds that the industry has already begun to do this, but at the same time it is being careful to take a mindful approach. “We want to focus on projects that make sense for our business,” he says, adding, “hopefully, we will identify some areas where we could get a competitive advantage if we do this at a pace that is sustainable but is also fast enough to capture the new technologies as they become available.”

Accenture’s Oppelt says that he does not believe that there is any specific metal or any specific part of the metals supply chain that is leading the charge, noting that he has seen examples of initiatives in both ferrous and non-ferrous metals, coming from mining companies, primary metal producers, distributors and end users alike. “It is much more company specific and specific to the leadership of that company.

“The common thread is the willingness to take on a little bit of risk in an effort to prove a certain concept or value and to have a process in place to assess the value of such moves and when to keep investing and when to put it back on the shelf for a little while,” he adds.

Meyer is quick to say that the support of Klöckner’s ceo, Gisbert Rühl, who sees digitisation as being absolutely key to the future of the metals industry, has been instrumental in Klöckner Metals’ aggressive push in charting a course for Industry 4.0 – a move that he admits is unique for a metals distribution company.

“If you are really serious about it and really want to make the leap from where you are to where you want to be, you have to think differently and you have to structure your organisation differently,” Meyer says. For Klöckner Metals, this has included the formation of its Digital Innovation group, which has a digitisation team that operates outside of its IT group and received a lot of support from its parent company’s recently built research and development and innovation office in Berlin.

Klöckner is not alone in taking this approach. Oppelt says that at least one primary metals producer is setting up what they call a digital centre of expertise, also operating outside of their IT infrastructure. In one such case, it is reporting to the company’s chief operating officer instead.

“We have a lot of initiatives relating to this, ranging from getting involved on the operational side, where we are adding new sensors and control boards onto our equipment to enable them to more efficiently capture data, to the use of analytics and software that is able to predict market demand,” Meyer says, as well as looking at how to tie all of this together and to share the information with both its mill suppliers and its customers.

He says that automation opportunities made possible by certain new software opportunities combined with the data his company collects through the use of radio frequency identification “is a huge leap ahead from bar code scanning – the prior technology.”

Meyer adds that Klöckner, as well as some other metals companies, are also taking logistics and transportation to the next level with greater automation in their trucks.

“We know where the trucks are. We can analyse the driver behaviour. We can centralise that information, use radio frequency identification to enable them to more efficiently capture data, to the use of analytics and software that is able to predict market demand,” Meyer says, as well as looking at how to tie all of this together and to share the information with both its mill suppliers and its customers.

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Gerdau has also taken some steps toward Industry 4.0 with Travaglini...
saying this includes the use of smarter robotics.

Ronald Ashburn, executive director of the Association for Iron & Steel Technology, observes that robots have been—and will continue to be—deployed in hazardous areas and elsewhere in mills for repetitive tasks with temperature and chemistry sampling of molten metal in the furnace being a prime example. “We’re now seeing the evolution of machines being able to manage an entire process via artificial intelligence,” he says, maintaining that the person-less melt shop is almost a reality.

Travaglini says that Gerdau has recently installed a robotic cell that has artificial vision that enables it to locate, scan and tag products. “While this is an example of a simple application, it goes beyond the traditional use of robotics, as these robots can react to the external world as opposed to just being an arm operating in a pre-determined space without a brain.”

He says that Gerdau has also added a more conventional, temperature-sampling robotic application in its Petersburg, Virginia, mill aided by a 360-degree, six-camera vision system that enables the company to look into the furnace, allowing it to do such things as inspect the refractory, assess water leaks and consistently assess the overall condition of the furnace on a visual basis.

Metals companies have also been making inroads in the collection and analysis of data with an increasing number of sensors—including smarter sensors—throughout the mill, Koch says, noting that this has already enabled greater digitisation as a whole, often in the form of increases in predictive, as opposed to reactive, maintenance of production equipment. “By making use of all of the big data that is being collected, companies can identify why something is going well or is going bad” and even predict why and when equipment is likely to fail.

Machine learning, which is said to be the first application for AI, could also play a role in predicting when a machine will begin to produce bad quality products or when it will fail in its current setup. With machine learning the machine takes over the role of making assumptions to predict the future. Koch says that Industry 4.0 technologies and algorithms could be used to pick up certain patterns, therefore speeding up this kind of prediction.

“While everyone is looking into AI software, this isn’t the same kind of AI that you see in science fiction movies,” Kloeckner’s Meyer points out. Rather, it is the use of automation to allow the user to make some leaps in logic to help them to streamline their production process through the collection, connecting and sharing of data.

The next step is to use these data to create a simulation—a virtual world that is a three-dimensional twin of the physical world, either within the production plant or even a virtual representation of the product that the company is looking to produce, Koch says, noting that this enables the company to make calculations about such things as production performance and product quality.

Zhou says that such visualisation and simulation technologies could be beneficial for a wide range of processes throughout the metals supply chain, including the optimisation of both energy usage and the material being produced through simulations that could be viewed in real time. She says this could just be a simplified model of just one process or several models connected together to enable the company to look at the relationship between various processes.

“Machine learning and artificial intelligence will help us but it won’t be as easy to implement as some people say,” Travaglini maintains. “While it will be great eventually, it will involve a lot of work in the beginning to get the results we want.”

Another big part of Industry 4.0 is the potential for interconnectivity throughout the supply chain, but that is an area that is slower to take off than the more “in-house” technologies, such as those that involve plant operations and maintenance, Accenture’s Oppelt says. While there are clear benefits of having more visibility and the ability to track both the status of raw materials and the stage a specific product is in the production process, “it comes down to who will gain the greatest benefits of such investments and collaboration,” he explains.

It is also a question of cybersecurity. “When you are dealing with products, the security of competitive information is very important,” Zhou points out.

Tomera agrees, noting that adding more connected devices increases the risk of a data breach or of someone hacking into a company’s IT systems. IT departments have been taking a number of steps in this area, including having better encryption and passwords in place and adding more staff to ensure that everything is secure. “But this is an area that requires constant attention,” he observes.

Another big challenge comes from the human resources side of the equation, Koch says, as workers will have to have a different set of skills, including those relating to slicing and dicing data to make decisions from that data.

Some sales people are initially concerned that they will lose their job, because of this shift, Meyer says, but some of that fear is actually unfounded. “Their job really is to manage the supply chain. If they are spending four hours a day typing orders into a computer that isn’t creating any value. The value is spending that time understanding what’s going on with your supply base, reconciling inventory against customer demand,” he explains. That said, Meyer adds that over time automation could replace some jobs, including high-technology skill jobs such as coding, web development and data analysis.

“While metals companies are currently a step behind in the implementation of Industry 4.0, they should start to catch up over the next two to three years,” Tomera says. This is partly to catch up with their customers that are further along in this process.
Emerging metal markets

India’s resolve

The Indian government’s resolve to reduce the number of heavily indebted companies weighing on the country’s banking sector has stiffened. Kunal Bose considers the impacts and benefits for the nation’s steel and metal companies

The coalition government led by Narendra Modi has made the radical move to empower the Reserve Bank of India (RBI), the country’s central bank, to fix the banking industry’s non-performing assets (NPAs), estimated at $180 billion. Earlier this year, the government amended the Banking Regulation Act, thus enabling RBI to ask lenders to initiate insolvency proceedings against companies that are found to have lost capacity to service loans as their stressed assets have reached “unacceptably high levels.”

According to financial experts, empowering RBI to give time-bound instructions to lenders to clean up their heavily bad-loans laden books was triggered by banks growing their loan books at the slowest rate, of 5.1%, in 63 years during 2016-17 (April to March.). No doubt the burden of stressed assets, amounting to about 17% of total loans, the highest among the world’s major economies, has curbed the capacity of banks for fresh lending. Finance minister Arun Jaitley will not accept the argument of bankers that slow credit growth is due to “excess industrial capacity.”

A steel ministry official says: “The country’s revised steel policy wants capacity to be raised to 300 million tonnes by 2030 from 125 million tonnes now. We also want total self-reliance in iron ore and reduction in import dependence on coking coal to 50%, coinciding with the country achieving its steel capacity target for 2030. But for funding this huge growth in steel and mining capacity, we need a robust banking sector, which unfortunately is not the case now.”

The steel sector alone accounts for 28% of all banks’ NPAs by value, so it is no surprise that of the 12 accounts that the internal advisory committee of RBI has identified in the first instalment for “immediate resolution under the Insolvency and Bankruptcy Code, 2016,” five of them are steel companies’. The 12 largest NPA accounts constitute close to a quarter of bank NPAs.

An official of a government-owned bank with a big exposure to the steel industry says: “See a total of 81 default cases have been filed for resolution under I&B Code. No prizes for guessing that many more steel groups are there in the long defaulter list.”

Improving fortunes?

Leaving aside those priority accounts needing resolution, the improvement in steel fortunes since last year and RBI’s introduction of three attractive loan-restructuring formulas should actually allow other debt-trapped steel companies to start servicing loans, according to bank officials. India’s steel secretary Aruna Sharma says: “There is a strong case to hand-hold steel companies at this moment, use RBI formulas to resolve NPAs and create conditions for relending.”

An official of the Indian Banks’ Association says: “The reason why India’s steel demand growth of 3% during 2016-17 fell short of official forecast of over 5% was because some of the major steel-consuming sectors, particularly construction and machinery building with bloated NPAs, were far from operating to capacity.” Stalling or very slow progress of many high-profile long-gestation projects in roads, power and heavy industries – affecting the capacity of promoter companies to service bank loans – continues to hurt steel demand. Low domestic demand was the reason for Indian steel exports to more than double last year, by 107% to 9.3 million tonnes, when imports fell by 37% to 8 million tonnes, thanks to trade actions.

The steel policy makes it clear that abundant reserves of iron ore should make it possible for India to remain not only self-reliant in steel, but also become a significant exporter. The policy says that crude steel capacity of 300 million tpy by 2030 will allow finished steel production of 230 million tpy. It is assumed that domestic consumption at that point will be 206 million tonnes and exports 24 million tonnes. India is principally targeting southeast Asia for steel exports where, against annual demand for 80 million tonnes, local production is an estimated 20 million tonnes. Bangladesh, Myanmar and the Middle East are also expected to emerge as important export destinations. Nevertheless, Indian steel will lose some competitive edge in the world market if its currency further appreciates against the US dollar.

Government-owned banks control around 80% of national deposits and loans. They need quick resolution of NPAs and massive recapitalisation to be able to grow their loan books at a double-digit rate, as demanded by the country’s ambitious economic development programme. This is exactly what the steel industry needs if it is to attain the capacity target set for 2030. According to analysts at Fitch, Indian banks will need fresh capital of $90 billion by 2019 to meet Basel III norms. The government’s recapitalisation commitment of $10.9 billion for
Steel outlook
Tata Steel’s India operations vastly improved during 2016-17 on the back of “steel deliveries rising by 1.43 million tonnes to 10.97 million tonnes, a better price environment and our growing focus to sell steel as branded products,” says TV Narendran, managing director. Because of its strong balance sheet, banks are comfortable in supporting the big expansion programmes of Tata Steel. “Groups such as JSW Steel and us have no problems. But banks are not well disposed to the steel industry in general,” says Narendran. Banks are not to be blamed since so much of their money is stuck with steel companies.

After Posco’s decision earlier this year not to build the 12 million tpy steel plant at Paradip in Orissa, for which it signed a memorandum of understanding (MoU) with the state government way back in 2005, and all three projects considered by ArcelorMittal have not proceeded, the option that India is left with is to build an additional 175 million tpy capacity in the next 13 years with its own money. “A big challenge indeed when so many steel groups are showing little signs of getting up off the sickbed and government banks need massive recapitalisation to be able to support steel capacity growth,” says a spokesperson for the Confederation of Indian Industry (CII).

Tata Steel is working to increase its steelmaking capacity. “We are about ready to go to the Board for its approval to build capacity of 5 million tonnes in Kalinganagar’s second phase,” says Narendran. “The distinguishing feature of that phase will be our installing of the country’s largest (5,800 cu metre) blast furnace there. We have got 3,000 acres of land at Kalinganagar. That is good enough to pack 16 million tpy capacity, if not more. At our 1,700 acre site at Jamshedpur in Jharkhand, we have steel capacity of 10 million tonnes and environment clearances from government agencies to add another 1 million tonnes. We will create the extra capacity there by knocking down some old installations to put machines of higher capacity, but which require less space.” The company hopes to be able to finally make Jamshedpur a 12.5 million tpy mill.

So Tata Steel is on course to own over 30 million tpy capacity in India. If conditions are favourable, the company may build a second greenfield mill in Jharkhand. In September 2005, it signed an MoU with the Jharkhand government to build a 12 million tpy steel plant in the state, which has abundant reserves of iron ore, but Narendran is not ready to say anything further on the Jharkhand greenfield venture at this stage. The government is keen that besides increasing capacity through organic and inorganic growth, financially strong groups such as JSW Steel and Tata Steel should buy some stressed assets and revive and grow them further.

Will JSW Steel, which in the past has been successful in turning around struggling mills, bid for any of the steel assets on the block? In 2015-16 (final) 2016-17 (prov) Variation %

<table>
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<tr>
<th>Product</th>
<th>2015-16 (final)</th>
<th>2016-17 (prov)</th>
<th>Variation %</th>
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<td>Sponge iron</td>
<td>14,523</td>
<td>14,830</td>
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</table>

Sources: Joint Plant Committee and industry data

Steel production data (000 tons)

India’s GDP growth (annual %)

Credit Suisse says in a note that banks will have to take haircuts of 56% of loans to steelmakers that have become sour. Rating agency CRISIL says 60% of loans will have to be written off to create interest among potential suitors of stressed steel assets.

International investment
Speculation is rife in India that the UK’s Liberty House, which has already bought steel assets in the UK, might buy a distressed steel company in India. Liberty is in discussion with the promoters and bankers of ABG Shipyards, which...
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Steel & Raw Materials • Base Metals • Scrap (ferrous & non-ferrous) • Ferro Alloys & Minor Metals • The All Metals Package
is one of the companies on RBI’s list of indebted companies needing swift resolution, about potential acquisition.

For now, the main international presence in India’s steel sector has remained restricted to Nippon Steel and Sumitomo Metal Corporation’s joint venture with Tata Steel to make 600,000 tpy of automotive-grade continuous annealed products at Jamshedpur, and JFE Steel of Japan supplying technology to JSW Steel, in which it also has some equity ownership.

The MoU that ArcelorMittal and SAIL signed in 2015 to make automotive steel in India in equal partnership could not proceed while awaiting resolution of some commercial terms, particularly the revenue-sharing formula. SAIL chairman P.K. Singh, however, says: “We have come to a stage where it is a matter of time before the joint venture agreement is signed.”

The JV will build a cold rolling mill and other downstream finishing facilities to make “technologically advanced steel products for India’s rapidly growing automotive sector.” Describing the venture as an ideal offshoot of prime minister Narendra Modi’s ‘Make in India’ (MII) campaign, Singh says that “the proposed Rs50 billion facility will buy 1.5 million tpy of hot rolled coil from SAIL’s new 3 million tpy hot strip mill at Rourkela to be ready for commissioning next year.”

“Indian steelmakers need more such tie-ups with global leaders to make locally very high quality automotive steel and cold rolled non-grain-orientated electrical steel for which the country remains import-dependent. But what India is sadly missing are integrated steel plants owned by foreign groups. This is in spite of the country allowing 100% foreign ownership of steel companies,” says the CII spokesperson.

**Automotive industry**

While steel remains a disappointment in terms of foreign direct investment (FDI), the good news from India’s perspective is that, at $62.3 billion, India was the world’s largest recipient of cross-border capital investment in 2016. The country enjoyed the same status the year before. Most major automobile groups in the USA, Japan, Europe and South Korea have manufacturing units in India and they are bringing in fresh capital and reinvesting their earnings in the country to create new capacity.

Hyundai has been in India since 1996 and now has capacity to make 700,000 passenger cars a year. Hyundai sibling Kia Motors is to build a factory in Andhra Pradesh with capacity to make 300,000 cars a year.

Taking a cue from China, India is on course to substitute arms imports by building domestic manufacturing capacity with help from the world’s leading defence equipment manufacturers. Encouraged by many significant reforms allowing foreign investment in the sector and an encouraging offset programme relating to components procurement locally, many world leaders in defence equipment and aerospace manufacturing have joined hands with leading Indian groups such as Tata, Reliance and Mahindra to build hardware and software locally. India’s defence spending is expected to swell to $62 billion by 2022. It is only natural that the defence sector is the principal focus of manufacturing inward investment, since the country remains the world’s largest importer of arms.

Taking into consideration the series of breakthroughs expected in defence equipment and aerospace manufacturing, the steel policy expects demand for 2 million tpy of special grades of steel from the sector. Indian steelmakers will have to acquire technology to make maraging steel, ultra-high-strength steels and high-alloy hardenable steel for the defence sector. India’s leading aluminium maker Hindalco, with capacity of 1.3 million tpy, saw the opportunities emerging in defence and automobile sectors early. The company’s focus now is to develop alloys for use by the two sectors.

Abhijit Pati, CEO of Vedanta Aluminium is excited that the government has persuaded the company to become a 100% electric vehicle (EV) nation by 2030. “This may well be a statement of intent. But there is realisation in the government that EVs are the answer to fight pollution caused by an automobile fleet growing by around 10% a year.” If EVs become a hit, then annual application growth of aluminium in the transport sector will be the highest among all user segments.

The seriousness to promote the production of EVs in the country is underlined by New Delhi promoting the requirement that 30% of car parts must be sourced locally. Such conditions will apply only to retail trading of goods by foreign entities. For example, Swedish furniture maker IKEA, which has plans to open 25 stores in different Indian cities over the next 10 years, will attract the 30% local sourcing requirement.

**Greater GDP share**

The government’s target is to increase the share of manufacturing in gross domestic product (GDP) from 16.57% now to 25% by 2025. As that happens, it is hoped that 90 million jobs will be created. During the 2014 parliamentary election campaign, the Bharatiya Janata Party (BJP) made much of the “10 years of jobless growth under the Congress led” coalition regime. But employment growth in the past three years of BJP rule has too remained “sluggish,” according to the government’s 2016-17 Economic Survey.

In fact, to the discomfiture of the government, the unemployment rate has shot up to a five-year high of 5%. The rate at 8.7% is significantly higher for women, by comparison with 4.3% for men, a Labour Bureau report says. According to the Labour Ministry, around 1 million people join the workforce in India every month. The government is putting great reliance on MII to break the curse of growing unemployment. Unless this is done, India will not be able to reap the demographic advantage of a population of 28 years of median age by 2020.

*The author is a specialist writer, based in Kolkata.*
Feed flexibility in copper smelting

The composition of copper concentrates has become ever more complex and challenging for smelters. Tim J.A. Smith briefly reviews the approaches and technologies developed to enable them to be processed.

Recent years have been marked by an increasing proportion of dirty and/or complex copper concentrates entering the global markets for smelting. Data published by Codelco indicated a seven-fold increase in such materials from 2013 to early 2016 (see graph).

The main challenge for smelters is arsenic, but other impurities are common, such as antimony, bismuth, lead and zinc, and may create challenges in smelting. Although they are not considered to be impurities, gold and silver levels associated with such complex concentrates are often high and their recovery impacts potential financial returns.

Complex materials typically run with 1-2% arsenic, but very complex materials may contain up to 10% arsenic content. Examples include concentrates from Chile and Peru, and other global mine sources are increasingly important. Examples of current high-arsenic concentrates include Marcapunta (Peru) with around 8%, Chelopec (Bulgaria) with about 6%, and DMH (Codelco Minero Hales Chile) concentrates with roughly 4% arsenic.

Challenges faced by smelters of such complex concentrates include increased smelter circuit complexity and associated treatment costs, impacts on product quality and margins, as well as environmental and regulatory challenges.

Tightened limits have been imposed for acceptance of certain impurities. China, for example, which has the largest market for the treatment of traded concentrates, will not accept materials with more than 0.5% arsenic content. Smelters have only limited capacity to accept dirty or complex feedstock and the global copper smelter arsenic treatment capacity shortfall in 2016 was estimated by Codelco at more than 20,000 tonnes.

Smelters levy treatment penalties on such complex feedstocks as overall treatment costs go up and smelter margins fall. In parallel with this, increasingly stringent environmental regulations continue to squeeze smelter flexibility, push up operating costs and make margins fall.

Recent demands for higher- or purer-quality products, and new certification processes, have imposed new burdens.

Process solutions adopted by miners and smelters to mitigate the challenges posed by complex concentrates can be broadly divided into two areas: process solutions before smelting; and furnace and in-smelter solutions.

Solutions before smelting

The simplest approach, which has been applied historically, is to blend complex concentrates with ‘clean’ concentrates prior to any normal blending that takes place within the smelter facility. This may enable the producer to customise the blend. There is, however, limited clean material available and this approach also leads to increased capital and operational expenditure (capex and opex).

Newer South and Central American mines with ‘clean’ concentrates include Las Bambas plus Cerro Verde and Toquepala expansions in Peru, Caserones and Sierra Gorda in Chile and Cobre Panama.

It was estimated in 2016 that worldwide blending capacity had increased by more than 80% to over 3 million tpy since 2012. Codelco installed a dedicated blending facility in Taiwan, which allows export to Chinese smelters.

Peru and Taiwan have the largest such blending facilities, closely followed by Mexico and Europe. Such blending has enabled substantial amounts of complex concentrates to be processed, but it can be argued that this represents only a temporary solution and the contained impurity elements still end up in the consuming smelter circuits, where they need to be addressed and fixed safely.

A second approach prior to smelting has been the adoption of improved concentrate cleaning. This includes technology such as finer milling, improved equipment and/or reagent strategy. All such approaches are concentrate-specific issues, which need test work and introduce increased processing costs for the miners.

Thirdly, a number of companies are investigating and developing hydrometallurgical concentrate processing routes such as the medium-temperature CESL (Cominco Engineering Services Limited) leach route operated at Vale’s Sossego operation in Brazil. Such routes aim to lower impurities and then extract the copper by direct electrowinning (EW) or solvent extraction (SX) plus EW techniques. These may offer a potential alternative to smelting. Such routes are likely to be costly both in terms of capex and opex. Although promising test work and small pilot operations have had some success, none, as yet, are fully developed and proven at a large commercial scale. A common challenge with such leach routes is potential gold and silver losses as well as the form, stability and disposal of the final arsenic-bearing waste residues.
Other examples of continuing research and development in this area include the Albion Process and Galvanox technology.

**In-process solutions**

Additional facilities have been developed for arsenic reduction or removal within, or adjacent to, existing smelters. Partial roasting technology has been widely applied to complex copper concentrates. This can facilitate the removal of a proportion of volatile impurities, such as arsenic, antimony and bismuth, to yield a cleaner calcine suitable for subsequent smelting in existing concentrate smelting plants.

The largest recent example of this approach is the roaster plant installed at Codelco’s MMH facility adjacent to the company’s Chuquicamata smelter in Chile. Calcine from the initial roaster installation had sufficient reduction in arsenic and antimony content to allow the calcine to be smelted in existing smelting units, along with unroasted concentrates.

Whilst blending facilities in Taiwan have been used to enable export of treated high-arsenic concentrates in the interim, the longer-term plan involves installation of additional roasting plant, acid plant and effluent treatment facilities at MMH to facilitate increased local treatment of such complex concentrates. Significant new capex has been required and the additional roasting plant operating line increases smelter, gas treatment and acid plant opex, which further reduces smelter margins.

**Modern furnace technologies**

Copper smelters operate with different technologies and the ability of these existing smelters to handle complex concentrate feeds thus varies. Older smelters are being gradually modernised or replaced, particularly in response to tightening environmental regulations and to reduce operating costs and improve feed flexibility.

From an environmental viewpoint, newer and more continuous smelting and converting technologies are gradually being implemented.

Outotec’s flash smelting combined with flash converting is the leading such newer technology being increasingly applied in new smelters. With suitable concentrates, this may be operated as a single one-step smelting and converting process.

Mitsubishi continuous smelting is also finding increased application with new plants in Mexico.

Top Submerged Lance (TSL) technologies, developed both as ISAsmelt (now owned by Glencore Technology) and the Ausmelt version (now owned by Outotec), have also achieved wide application, but both versions generally still use old Peirce Smith (PS) batch converting with its inherent environmental challenges.

A significant number of smelters still operate using Modified Teniente Converter (MTC) primary smelting units developed by Codelco in Chile as primary smelters, but again operating with batch PS converters.

Recent developments have seen significant growth in the application of Chinese-developed copper smelting technology, mainly within China but with recent plans to transfer this technology into western smelting operations. The major emerging technology referred to as Bottom Blown Reactor (BBR) and as SKF (which relates to a Chinese name), has seen further development of a similar vessel for the subsequent converting operation, referred to as a Bottom Blown Continuous Converter (BBCC). There are at least seven plants in operation using BBR and a few with BBCC, and at least seven additional plants are planned.

A combined BBR/BBCC plant is about to enter the feasibility study stage for the Enami Paipote smelter in Chile as a replacement for the old CMT and Hoboken converter plant, as the existing plant will be unable to meet Chile’s revised environmental regulations.

These emerging technologies, as indicated, are more continuous and thus enable environmental criteria to be met and operating costs to be improved.

The environmental trend is away from old primary smelting units and PS converting. Whilst primary smelting technology has improved, PS converting remains a major challenge. PS batch operation and associated asile ladle movement and transfer activities, all represent challenges to the improvement of fugitive gaseous emissions. Modernisation of PS converters by retrofitting large secondary and even tertiary hoods and gas capture systems and its subsequent handling and treatment, involves major capex and opex.

For these reasons proven and emerging CC technologies are gaining ground and can offset the slightly higher initial capex by reduced opex from energy and acid plant credits.

Smelters fitted with CC units may, however, be less able to treat complex or dirty feeds because the older batch technology enhanced some of the impurity elimination. Such improvements in smelting technology to meet tighter environmental regulation may therefore work against the use of increasingly dirty feedstock.

Typically, higher use of oxygen enrichment is applied in more modern smelting technology, which reduces furnace and gas handling system sizes but results in increased smelting intensity and higher temperatures, which in turn shifts impurity deportment into the gas stream. Acid plants are thus forced to treat higher loads as the main ‘collector’ of volatile impurities such as arsenic.

Ideally, smelter complexes become more closed with zero discharge. The need to bleed and then handle, store or control complex and dirty residues arising during smelting becomes more challenging and costly.

Smelters also need to deal with secondary feedstocks, including copper scrap as well as various intermediate and revert/recyclable materials with lower copper content and perhaps complexity. Clean scrap is an essential coolant in the old batch PS converting copper blow stage, which generates ‘free’ heat energy to melt such materials. In a conventional older smelter, refinery spent anodes may balance PS converting needs. Modern primary smelting and CC technologies are often less able to melt and consume large quantities of refinery spent anodes or melt purchased clean scrap.

The treatment of lower-grade copper secondary materials is a far more complex topic and often needs specific custom-designed smelter solutions. Older plants that were able to combine copper, lead and zinc smelting facilities at one complex, such as La Oroya in Peru, offered greater feed impurity flexibility — albeit that the eventual handling and storage of impurity-containing residues may not have always been properly addressed. The Kosaka smelter in Japan also achieved similar flexibility for complex feeds in a more modern plant.

A number of copper smelters are now seeking added value by installing extra process facilities to add flexibility for treatment of such secondary materials along with improved margins.

The author is an independent smelter consultant.
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ISP is alive and well in Poland

HCM has produced zinc metal in Poland for nearly 50 years. Ann-Marie Moreno summarises how a smelter built on the Imperial Smelting Process (ISP) has updated its technology to adjust to big changes in feedstock, serve European market trends and meet the region’s tightening environmental demands.

Two shiny new thallium-removal tanks are the latest piece of equipment acquired by Huta Cynku Miasteczko Śląskie SA (HCM) as it adapts to treating a whole variety of secondary feeds. Marek Drosik, commercial director of both HCM Śląskie and its parent company and fellow Polish zinc smelter ZGH Boleslaw SA (ZGH), explains the need: “We have thallium in the some of the oxides we take from the copper processing and other industries. It is difficult to handle and under EU regulations must be removed.” The process, installed in May this year, neutralises waste water and removes thallium via a leach and sedimentation process. Similarly, since the company started treating greater volumes of secondary feeds, a chlorine washing plant has also been installed.

The move to replace a large proportion of its bulk concentrate supplies – the traditional feedstock for an ISP smelter – with secondary oxides and other secondary material has been part of a transformation that has been in train for the best part of a decade. That transformation has been both technological and corporate, with HCM becoming fully privatised and incorporated into ZGH Boleslaw Group, along with the Boleslaw smelter, associated mines and Boleslaw Recycling.

The original ISP plant at HCM, which is located in southwestern Poland, was opened in 1969, with a second line starting up in 1979. Today only the second, more efficient ISP plant is in operation, with a capacity of 89,000 tpy of zinc and 23,000 tpy of lead. The decision to move away from concentrate feed to secondaries and oxides was primarily economic. “Secondaries are cheaper to buy and there is plenty of feed on our doorstep here in Europe,” says Drosik. Additionally the options for securing bulk lead-zinc concentrates have become limited over the past couple of decades, and today HCM has practically just one supplier – the McArthur River mine in Australia.

Flexible technology
ISP is far from being a new technology, but most metallurgical engineers still consider it a very useful process route that can cope with a wide range of feedstock qualities and has a high tolerance for impurities. The heart of the process is the blast furnace, which produces zinc and lead simultaneously. It is based on metallurgical coke and not electricity. Developed in the UK in the 1940s, today only a handful of ISP smelters continue in operation, mainly in Asia. HCM is the sole survivor of seven ISP smelters that once operated in Europe, as others succumbed to rising costs, high coke prices and lack of feed.

Today’s feedstock at HCM is 60% oxides and 40% primary concentrates

Today’s feedstock at HCM is 60% oxides and 40% primary concentrates

While the secondary feeds do not require an acid plant, they still contain too much sulphur to be emitted to atmosphere, so a desulphurisation plant was installed several years ago, which yields synthetic gypsum as a saleable by-product. The main non-concentrate feeds that HCM takes are Waelz oxides (based on EAF dusts), complex skimmings and ashes, hydro oxides from copper processing and other industries, and leach residues from Boleslaw’s electrolytic zinc refinery. “Most electrolytic refineries deal with their residues using the jarosite or other neutralisation processes. At HCM we treat them in Waelz kilns to finally process at HCM,” says Drosik.

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Non-ferrous technology

geographically close to Boleslaw. Similarly, HCM is able to take the higher lead (12-15% Pb) Waelz oxides that are produced at Boleslaw that cannot be fed through the latter’s electrolytic refinery. Having commercial teams at the ISP and electrolytic plants working close with each other also has its benefits and synergies, as Drosik and his teams can optimise sourcing of raw material types for the two units.

Refining capacity

Another major change at the plant, in response to market needs, has been an increase in refining capacity. ISP plants produce Good Ordinary Brand (GOB) zinc with around 1% lead, so to be able to produce all Special High Grade LME-deliverable zinc, a second refining line was commissioned in 2015. “Actual nameplate capacity of the entire plant is 52,000 tpy, but we have far exceeded this,” says Drosik, “and it is able to run at 89,000 tonnes.”

HCM produces GOB and SHG zinc

“HCM was built to operate on imported concentrates and the logistics for that are quite simple. We have one train a week bringing in concentrates from the port on the Baltic,” says Drosik. “However, the new feeds come from all over Poland and Europe, mainly by truck – as many as 35 a day. We can have feed coming in regular container trucks, in big bags, or in silo trucks. So handling the secondaries is quite complex.”

Given the nature of the materials and environmental controls in the EU, there are many legal and regulatory requirements to be fulfilled. “Some of the materials we handle are classified as hazardous, others not. Our integrated pollution prevention and control (IPPC) permit had to be completely revised to allow us to operate as we do today – even though we generate little waste and hardly use our own certified dangerous waste landfill areas,” says Drosik.

The process of transformation is continuing and HCM is now looking to the future for further cost savings and revenue streams. Today, in addition to zinc, lead and sulphuric acid as main products, the plant recovers silver to 98.5% purity, copper, cadmium and lead-bismuth alloy. Tin could be another potential revenue stream. At the moment the plant cannot treat tin-bearing wastes as this would impact on the composition of the GOB zinc, but if the company were to move to all SHG zinc production – especially if the much talked-of ban on the use of lead-bearing GOB zinc in the brass industry becomes a reality – then there would be more scope for tin recovery.

Another potential for improvement is to reduce coke consumption. At present it takes 1 tonne of coke to make 1 tonne of zinc but, drawing on experiences in the steel blast furnace industry, there could be scope to reduce coke usage to as low as 600 kg/tonne by replacing part of it with cheaper pulverized coal injected into the tuyeres at the bottom of the furnace (lumpy coke is currently introduced from the top). This would require a fuller understanding and control of the energy and temperatures in the lower part of the blast furnace, but it is something which the company is closely looking at, especially as coke prices are governed so closely by what is happening in the steel, rather than non-ferrous, industries.

Challenging logistics

Logic has been a challenge: “HCM was built to operate on imported concentrates and the logistics for that are quite simple. We have one train a week bringing in concentrate from the port on the Baltic,” says Drosik. “However, the new feeds come from all over Poland and Europe, mainly by truck – as many as 35 a day. We can have feed coming in regular container trucks, in big bags, or in silo trucks. So handling the secondaries is quite complex.”
Non-ferrous technology

Liquid metal engineering

The Future Liquid Metal Engineering Hub at Brunel University London is helping to develop a fully sustainable light metals industry. Ben Hargreaves profiles its capabilities and the role it plays

Brunel University London, UK, has a heritage in engineering and well established links with industry. Its Future Liquid Metal Engineering Hub (LiME) has a vision to establish the scientific basis, technology and industrial strategy for the closed-loop recycling of light metals such as aluminium and magnesium — or "full metal circulation" as LiME calls it — helping to develop a fully sustainable light metals industry.

Funded by the British Engineering and Physical Sciences Research Council (EPSRC) and located at Brunel’s BCAST facility, part of the university’s Institute of Materials & Manufacturing on its Uxbridge, west London, campus, LiME is one of a number of EPSRC-backed manufacturing hubs across the country, which are focused on bridging the gap between academic research and industrial capability for the benefit of the UK economy.

The original LiME centre was opened in 2010 by the EPSRC, with the Hub established in November 2015. LiME’s core activities are supported by complementary expertise at academic spokes at Oxford, Leeds and Manchester universities, and Imperial College London, and with more than £40 million (about $50 million) of new investment from its industrial partners.

LiME focuses on fundamental and applied research into nucleation and solidification of light metals with a focus on the closed-loop recycling of aluminium and magnesium alloys. It also researches downstream metals processing such as extrusion and sheet rolling. It benefits from being part of BCAST, which contains industrial-scale plant for casting. The main industrial partners currently working with LiME and BCAST include global aluminium semi-product designer and manufacturer Constellium, and leading UK automotive manufacturer Jaguar Land Rover.

Retaining value

Dr Mark Jones, LiME manager, explains that the hub is "all about recycling materials and sustainability". A key focus of LiME is developing new alloys and technologies to improve the mechanical properties of light metals so that automotive manufacturers can make parts that use less material, but have an even higher performance. It is also modifying the microstructure of aluminium alloys at the casting stage so that they can contain a higher proportion of scrap aluminium. A specific aim of LiME is to recycle aluminium parts and retain their value in future use — high-level recycling, which retains the recovered aluminium at the same level of use, rather than downgrading of high-grade scrap aluminium from end-of-life vehicles for the manufacture of lower-value products.

Constellium has been working with LiME since 2011. Martin Jarrett is operational excellence and technology director at the company’s Automotive Structures and Industry Business Unit, and the director of Constellium’s University Technology Centre (UTC) at Brunel. He explains that he “keeps his eye on R&D at various universities”. He notes Brunel’s capabilities around novel processing techniques, such as melt conditioning of aluminium alloys to tolerate high levels of scrap and impurities. “From a sustainability point of view, that’s important to us,” he says.

Microstructure modifications

Using more scrap increases the sustainability of light metals casting, but it requires considerable modifications to the microstructure of the alloy at the nucleation phase. The recycling and remelting of aluminium can result in iron impurities making their way into the alloy, but by modifying the distribution of second-phase iron particles during melting so that their distribution is finer, it is possible to produce materials with equivalent or better mechanical properties that contain greater levels of impurities, explains Jarrett. Ultimately that means a greater proportion of scrap can be employed in all alloys, including free-machining alloys. The use of alloying elements such as lead and bismuth in free-machining alloys can be reduced, or, in the longer term, even eliminated. "We still achieve excellent machinability — in fact, we achieve the same machinability we would achieve with high levels of lead and bismuth," notes Jarrett.

"For our automotive alloys, what we are enabling is a higher tolerance for iron and other impurities because we are able to modify the microstructure so that the iron-containing particles are better distributed. So there is less impact on the final material properties. We get improved ductility, and we can use high levels of scrap," Jarrett explains.

New alloys

Constellium has developed a series of new 6000 series aluminium alloys, using the research and casting capabilities at LiME and BCAST. Two of these alloys — HSA6 and HCA6 — are notable for their high-strength and crush performance, respectively. The ultimate tensile strength of HSA6 used for a hollow profile is 400 MPa.
“Effectively, this was previously unheard of,” claims Jarrett. “We are now the benchmark in this field. And we were able to develop an understanding of these alloys with LiME.” Because Constellium operates globally, innovations such as these can find their way into the global automotive supply chain, he adds. LiME and the UTC work closely with Constellium’s R&D centre in France to provide a global R&D capability for Constellium’s automotive structures business.

Jaguar Land Rover, meanwhile, is also said to have substantially increased the level of scrap aluminium used in manufacturing thanks to collaboration with LiME and BCAST.

Extrusion focus
Constellium is focusing on the development of structural aluminium extrusions for the automotive sector including crash management systems, body-in-white structures, chassis, and battery modules. Jarrett explains that the company is looking at the potential to replace steel structures with aluminium ones wherever possible to save weight and cut vehicle emissions, and also the potential to make current aluminium solutions lighter. In doing so, it is imperative that aluminium structures have the requisite mechanical and structural qualities – that alloys crush in the correct way, for example. All this must be achieved within the boundaries of closed-loop recycling.

“We have been able to replace some existing aluminium structures with our new high-strength range of alloys,” says Jarrett. “And if you increase bumper strength by 10%, you can take the equivalent amount of weight out of the vehicle. There is a direct equivalent between the strength of the material and the ability to remove that amount of material by reducing the section size — and thereby reducing the weight.”

Bridging a gap
Bridging the gap between university-level research and commercial products within manufacturing industry is a challenge. It is sometimes said that new innovations must traverse a so-called ‘valley of death’ in order to prosper in the marketplace. NASA quantified this journey with its development of the technology readiness level (TRL) scale, a platform followed for the scale-up of BCAST materials and technology. It ranges from TRL 1, basic research, to TRL 9 – a system that is tested and successfully launched. Jones believes that LiME and BCAST provide a means of negotiating all the technology-readiness levels within the scale, from fundamental research to launch of product, aided by the industrial-scale plant that is the hallmark of BCAST itself.

Jones says: “We have the laboratory equipment, but we also have our BCAST scale-up facilities (see panel), where we can develop a product for its application. We can manufacture extrusion billets on Brunel’s campus, testing and proving the fundamental research and physical output from LiME. If you are an automotive manufacturer or supplier looking to cut R&D time, and the time it takes to get a new product to market, that is a very attractive combination.”

Eric Nyberg, director of programmes at BCAST, says that many more industrial partners are likely to come on board at LiME because of these qualities. “One of our biggest advantages is that a lot of companies don’t have the opportunity to invest millions in a research centre, where you have very specialised equipment, expertise and people. We provide the opportunity to carry out fundamental and applied research – and then to see if what looks promising at a fundamental scale is actually possible at full scale.”

Can smaller firms benefit? SMEs from across Britain are already working with LiME, including firms such as Coventry-based low-pressure aluminium die caster Sarginsons, and more are expected to follow.

Nyberg concludes: “We want to support the UK’s industrial capability. The rebirth of die casting and metal extrusions, with state-of-the-art metal casting capabilities, is an opportunity that we hope will be embraced by the metals industry here in Britain.”

The author is a specialist writer based in London

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**The value of BCAST**

The Brunel Centre for Advanced Solidification Technology (BCAST) was founded by Professor Zhongyun Fan in 2003 as a research centre on the Brunel university campus. Fan pioneered high-shear technology for melt processing, initially using a twin-screw machine and then a simple rotor-stator device. The rotor-stator subjects the melt to a combination of shear strain and turbulence that disperses oxide films and homogenises the melt. This technology can be applied to all casting processes so that the as-cast state is dramatically improved.

This high-shear process eliminates the need for conventional grain refinement, reduces or eliminates defects, can be used to remove impurities or make alloys more tolerant of impurities, and can provide rapid degassing to hydrogen levels in aluminium to a level never achieved before, explains Brunel.

Two of the key facilities at BCAST are the Advanced Metals Casting Centre (AMCC) and the Advanced Metals Processing Centre (AMPC). “The plant can take fundamental research that looks promising and scale it up in a timely fashion,” explains Dr Simon Butler, head of both the AMPC and AMCC. He explains that the scale of the facilities makes them particularly valuable. “If a company wants to find out whether a technology works they can do here without having to interrupt their own production line.”

Equipment shared between the two facilities includes a 1,600-tonne extrusion press, a 1,600-tonne high-pressure die caster, and a low-pressure die caster, with DC casting to manufacture aluminium extrusion billets for the extrusion line. There are sand casting facilities and bending and processing capabilities. Materials characterisation equipment includes CT scanners and three-dimensional X-ray tomography of components to examine the internal structures and dimensional characteristics of a casting.

Butler says: “The two buildings are like two mini factories that resemble a modern manufacturing environment, not a laboratory. A key area for researchers is developing aluminium alloys that are more tolerant to iron impurities (see main text), and coming up with novel ways of removing iron from the final aluminium alloy. “We are able to take contaminated recycled scrap and process using novel ways of managing the temperature profile to extract impurities.” The AMCC was launched in April 2016, and the AMPC is close to completion.

BCAST’s computer-aided engineering and simulation capabilities are to be proving valuable in the race to produce environmentally friendly castings with the right mechanical properties for automotive and other sectors.
Making the most of metal powders

By using proprietary electrochemical process technology, UK-based Metalysis is working to expand and exploit the range of metal powders that can be made for high-performance alloy production. Richard Barrett summarises progress to date and asks company CEO Dion Vaughan about business priorities for the future.

The year 2017 is set to be a memorable one for Metalysis, a UK-based solid-state metal and alloy technology company. In March this year, the company opened a new R&D centre on the Advanced Manufacturing Park between Sheffield and Rotherham, South Yorkshire, UK. Called its Materials Discovery Centre, the new facility will carry out bespoke, commercial R&D projects to produce innovative metal powders for high-performance alloys.

“I describe our company as a mature start-up,” said Metalysis CEO Dion Vaughan, speaking at the formal opening of the centre. “We are young in terms of the global metals industry, but at the same time, we are an established player with a unique, disruptive metal powder production process.”

That process, for which Metalysis has global rights, uses metal ores and oxides as a feedstock (see box), which are converted electrochemically into metal powders suitable for applications including master alloy production or materials for use in additive manufacturing (3D printing).

“Metalysis’ solid-state process enables the production of vast numbers of new alloys yet-to-be conceived,” said Vaughan. The potential permutations and combinations of two or more of the 60 most-common elements in the periodic table are of course enormous, but it will be the mission of Metalysis and its partners to identify which of those will be profitable to pursue for innovative alloy production. Very many of them would be impossible to produce by conventional melting technologies, because they include elements of widely differing melting points and densities, Vaughan pointed out.

Making the most of metal powders

Looking forward, he sees established technologies like hot isostatic pressing and metal injection moulding continuing to play their role in manufacturing, but he is convinced that much more will be done with powders in the future: “Not if, but when.”

With some estimates for the rapid growth in demand for metal powders in 3D printing standing at 30% a year, albeit from a low initial base, he sees huge potential for future demand. He also sees this as part of the trend towards smart factories of the future, with local, modular, robotised and flexible material supply for manufacturing being provided on-demand and on-site.

Deals done

With current staff numbers standing at about 70 across the company’s two sites, Metalysis is also expanding at its Materials Production Centre at nearby Wath-upon-Deearne and anticipates employing 100 staff members or more on completing its expansion.

The company’s recent £10 million expansion covers the work at the new R&D centre and its Materials Production Centre. The business has been supported by shareholders and partners, who include Iluka Resources, BHP Billiton, Interogo, Seven Spires, Khome International and Woodford Patient Capital.

Rare earth miner Mkango Resources announced in March this year that it would be working with Metalysis on a commercial R&D programme to develop 3D printed magnets for electric vehicles.

In mid-May, Metalysis announced that it had signed an agreement for a commercial R&D programme with an international partner to use its electrochemical process to co-produce an aluminium-scandium alloy, targeting higher scandium content than is currently available on the market, at materially lower manufacturing costs. The R&D programme will investigate the use of Metalysis’ technology to provide a scandium-rich feedstock addition, supporting master alloy production.

Metalysis points out that scandium’s cost is high, which has often proven to be prohibitive to its use despite its valuable properties. The metal is largely mined as a...
by-product, which can make supply inelastic. “Metalysis’ process is capable of producing a wide range of metals and alloys at a lower cost and environmental footprint than traditional melting processes, which may aid in resolving cost constraints encountered in manufacturing aluminium-scandium alloys,” the company stated.

In late-May, Kazakhstan’s Autonomous Cluster Fund (Almaty Tech Garden) signed a Memorandum of Understanding with Metalysis in Astana to develop high-value metals and alloys for additive manufacturing. The programme is intended to support development of Kazakhstan’s metal additive manufacturing industry, basing in-country efforts within Kazakhstan’s Park of Innovative Technologies – a science and technology complex aimed at diversifying national, economic and industrial development.

“Kazakhstan is very interested in looking at how the technology can apply to their mineral feed base,” said Vaughan. “We are confident of securing a contractual agreement,” he told Metal Bulletin Magazine in early July. Initially, an R&D programme will be conducted at Metalysis’ Materials Discovery Centre.

Metalysis’ technology is said to improve productivity, economics and environmental impact for a range of metals and novel alloys needed for applications in 3D printing, aerospace and automotive components.

“Titanium compositions for lightweighting vehicles, high entropy alloys for aero engines and rare earth elements for permanent magnets for electric vehicles are a few of the projects we are working on,” said Vaughan at the R&D centre opening.

**Outlook**

“For the next two years, our focus will be on 3D printing, lightweighting with titanium and aluminium-scandium alloys, for aerospace and automotive, as well as the drivetrain and magnetic components for electric vehicles,” says Vaughan.

He says that progress within Metalysis’ Generation 4 expansion is on track, with hot commissioning due in the early part of the fourth-quarter of 2017. Generation 4 is designed to be the “universal commercial module” that can be used singly or in combination with multiple identical units to scale up powder production, as Generation 5.

Vaughan says that Metalysis is scouting for suitable sites for its Generation 5 feasibility study. While the company would prefer a location conveniently close to its existing two sites in the UK, it would look further afield and even overseas if necessary, he concluded.

**Five generations**

Metalysis has global rights to a solid-state metal powder manufacturing technology, originally based on the Fray-Farthing-Chen (FFC) Process invented at the University of Cambridge.

Metalysis ceo Dion Vaughan describes the process as “The heart of our electrochemical black box, which can today reduce almost all oxides in the periodic table and most metal ores directly into metals and alloys.” He also says that the process can make conventional alloys in a more energy-efficient way.

As the electrochemical process used by Metalysis has evolved from the laboratory bench through the prototype stages and on to the full industrial scale envisaged now, five generations of cells have been developed.

Generation 1 and 2 cells are installed at the company’s new R&D centre. The first-generation cells produce tens of grams of material per batch for experimental new alloy combinations, and also serve the purpose of initial quality control – for example, checking a new source of feedstock.

The process is closely monitored for performance and a variety of analytical equipment in the laboratory on site is used to test the metal powder produced. The packing, flow, particle size and shape of the metal powders produced are checked and their chemical content analysed.

The Materials Discovery Centre has capacity for 16 such Generation 1 cells. They are used for work on the company’s own core research and development programmes on the process itself and different powder combinations, as well as for commercial tests for third parties.

Metalysis has high entropy alloys in focus as one of its own research programmes, studying the behaviour of what would have previously been regarded as ‘chaotic’ mixtures of five different elements for their potential to make innovative alloys combining the best features of each of their individual ingredients. This also provides data for the company’s electrolysis model, which it uses for predictive modelling of the outcome of the process. Goals include, for example, production of refractory or very light alloys that have not been possible to produce in the past.

On a larger scale, Metalysis is also looking at the best means to introduce specific oxide powder combinations into the cells and the most efficient techniques to remove the, water-soluble, calcium chloride electrolyte films formed on the metal powders produced by the cells. Feedstock preparation – such as blending of the metal oxide powders fed in, and post-processing of the metal ‘cake’ produced to turn into powder, are key steps of Metalysis’ proprietary knowledge.

The two, much larger, Generation 2 cells at the R&D centre, which has sufficient space for four more, can produce 5-10 kg of metal powder each, in an electrolytical process that typically takes up to 48 hours to complete each batch, including heating up to above the melting point of the electrolyte, and cooling down for removal of the metal powder formed. Those batch sizes are suitable for hot isostatic pressing or additive manufacturing tests downstream and are effectively already capable of commercial metal production of the most exotic materials.

One material the company is well known for is titanium. Metalysis produces titanium using its Generation 3 cells at its production site in the Dearne Valley. Generation 3 cells have four-times larger titanium production capacity than Generation 2, and the next expansion phase, Generation 4, will be completed in 2017. Generation 4 will operate on a semi-continuous batch process, in which multiple units run in rotation to ensure that while one is always hot and producing, others are being charged, heating up, or cooling down before discharging their product.

The Generation 4 expansion is well under way, designed to produce hundreds of tonnes per year of speciality metal alloy powders. Metalysis raised more than £20 million in 2016 to build this generation of its plant in Wath-on-Dearne.

It is envisaged that this industrial-scale level of production will provide ‘distributed’ or just-in-time production of batches of metal powders on demand, close to their point of use for applications like additive manufacturing.

Generation 5, for which Metalysis has a feasibility programme in place, will step up production by an order of magnitude by linking together multiple Generation 4 modules.

Depending on which business model would be capital-efficient, linked in turn to company size and level of powder demand, Metalysis is open to a licensing or an equipment leasing model for its technology as a joint venture.
Supply chain services

Atlas Copco wins orders from Hindustan Zinc

Atlas Copco has won several recent orders from Hindustan Zinc, India’s integrated zinc-lead-silver producer, for equipment that will make the mining company’s operations more efficient as they become more digitalised.

Owing to a significant increase in underground mining output, Hindustan Zinc is automating much of its operations in order to increase productivity and safety. As part of that process, it has placed an order totalling €24 million ($27 million) with Atlas Copco that includes drilling rigs, loaders, haulers and exploration equipment, which will be used in five of its mines in north-western India.

Automation and other high-technology features of the equipment are enabled through the common Rig Control System platform and most of the machines are equipped with the telematics solution CERTIQ, which gathers, compares and communicates equipment information and performance.

“We are proud to play an important role in Hindustan Zinc’s moves toward highly effective, partly automated mining,” said Helena Hedblom, president of Atlas Copco’s Mining and Rock Excavation Technique business area.

Steel-coil-carrying train operation inaugurated

The honourable minister for railways, Suresh Prabhakar Prabhu, has digitally inaugurated the first steel-coil-carrying special freight train operations (SFTO) rake of TM International Logistics Ltd (TMILL) from Rail Bhawan in New Delhi, India.

TMILL, a joint venture of Tata Steel, NYK Holding (Europe) B.V. and IQ Martrade Holding GmbH of Germany, commenced operations with three BFNSM1 rakes. The first rake (railway wagon) carrying steel coils departed from Tata Steel’s Jamshedpur plant for Chennai and the rakes will also be deployed for carrying finished steel products from Tata Steel’s Kalinganagar plant in Odisha.

SFTO is a policy initiative by Indian Railways to encourage private investment in rolling stock. Under the policy, TMILL has been granted a 20-year licence by Indian Railways to invest in/lease rakes for movement of finished steel products.

The BFNSM1 rakes can carry 2,750 tonnes of steel coils per rake and are said to offer a competitive alternative to freight movement by road.

Sandipan Chakravortty, chairman of TMILL, said: “With this, a new era has begun in efficient and cost-effective rail transportation of steel coils in India.” “This is an important strategic initiative for TMILL Group. We expect this business to grow exponentially in the coming years. We would like to thank Indian Railways for their support in making this a reality,” added R N Murthy, managing director of TMILL.

Welsh Government invests over £660,000 in steelmaking

The Welsh Government is investing more than £660,000 ($856,000) in research and development to help safeguard the long-term future of steel production in Wales by developing new higher strength steel products.

Economy secretary Ken Skates has announced that £666,327 of Welsh Government research and development grant funding is being made available to Tata Steel to help the company develop new and innovative higher strength steel products at its sites in Port Talbot and Llanwern. The funding is in addition to Tata’s own investment in the two-year development project.

“The Welsh Government has been working to support Wales’ steel workers and this latest offer demonstrates our continued commitment to safeguarding a long-term future for the steel industry in Wales,” said Skates.

“Increasing the level of steel-related research and development taking place in Wales is critical if we are to meet the demands of the market and secure the long-term future of Welsh steel. Not only will increased research and development enable us to develop new products here in Wales, it will also increase our competitiveness, help to reduce costs and enable us to reduce our carbon emissions,” he concluded.

This latest funding agreement is part of a wider package of support from the Welsh Government for Tata that includes £4 million ($5 million) of funding towards skills development activities across Tata’s Welsh operations and a further £8 million ($10 million) investment in its Port Talbot plant to reduce energy costs and carbon emissions.
Vale’s $70 million saving with software innovation

Vale, in partnership with Chemtech, is implementing a new management system for its iron and manganese ore units in Brazil. The new software package, which will be put in place at 38 mines, plants and warehouses, is replacing 17 other systems. Called Vale Production Management - Mining (GPV-M), it has already been implemented at 20 facilities in Minas Gerais, Maranhão and Pará.

Development of the GPV-M initiative, said to provide potential savings of more than $70 million until 2020, was started in 2014 by Vale’s Information Technology and Ferrous areas in partnership with Chemtech, a Siemens Group company. Its introduction is said to offer three major financial gains. One is a reduction of the IT costs with maintenance and evolution of different systems and platforms, which represents $19 million savings up to 2020.

The second gain is the avoided cost to business due to the reduction of operational impacts caused by system downtime. And lastly, relevant gains are expected with more labour productivity and reduction of unproductive hours of the assets, supported by improved usability of the system.

Brunel and JLR combine on lightweight car parts

Researchers at Brunel University in the UK have teamed up with Jaguar Land Rover (JLR) to develop a new generation of ultra-light car parts. The three-year, £7.5 million ($9.7 million) project will focus on high-pressure die-cast aluminium and magnesium parts.

“Liquid metal engineering experts will work on it from Brunel’s Advanced Metals Casting Centre and Advanced Metals Processing Centre at its Uxbridge campus in West London,” a university spokesman said. “The aim is to perfect incredibly light, thin-walled aluminium die-cast parts for future Jaguar Land Rover vehicles, which could be used for shock absorption, chassis parts or door closures.”

The project is being funded by contributions from the UK government and the project partners, including Magna International, an OEM supplier to JLR, as well as JLR itself and others. It forms part of a £62 million ($80 million) commitment from the UK’s Advanced Propulsion Centre (APC), “The funding demonstrates the depth of low-carbon development that is in the UK,” APC ceo Ian Constance said in a statement. “From powertrain to lightweighting, to energy storage, these new projects will not only lower emissions but secure thousands of jobs, address supply chain gaps and help the UK become a true global leader in advanced vehicle technology,” he added.

Royal Mint’s Shariah Standard Gold compliance

The UK’s Royal Mint says it has become the first mint in the world to achieve compliance with the Shariah Standard on gold for retail sales of its gold and silver bullion coins and bars. The move is part of The Royal Mint’s strategy to be seen as the ‘complete bullion solution’ – offering a comprehensive range of bullion products that are suitable for a variety of investors. The organisation has been endorsed as Shariah-compliant by Shariah advisory organisation Amanie Advisors, in accordance with the Shariah Standard on gold. This standard is set by the Accounting and Auditing Organisation for Islamic Financial Institutions and has been developed in co-operation with London-based World Gold Council.

“The growth in Islamic investment globally and the clarification of how gold and silver can be included within it could drive upwards of £20bn of investment in gold over the coming years. This is a great time for The Royal Mint to be playing its part in attracting Islamic investment to the UK, by securing Shariah-compliant status for its bullion products,” said Chris Howard, director of bullion for The Royal Mint.
End user

Ford recycles 20 million pounds of aluminium a month

Chip Conrad, a Ford stamping engineer, has led the design of an expansive closed-loop recycling system that enables the motor company to reduce waste, save energy and improve sustainability. The system is saving enough recycled, high-strength, military-grade aluminium alloy to build either 51 commercial jetliners or more than 37,000 new F-Series pickup truck bodies a month.

At the heart of the closed-loop recycling system is a large, automated vacuum system with more than two miles of tubes crisscrossing the plants. Developed at Dearborn Stamping Plant, where the aluminium-alloy bodied F-150 pickup is built, the system is now in use at Kentucky Truck, and Buffalo Stamping, which manufacture alloy panels for F-Series trucks.

As doors and fenders are stamped into shape, scrap material is shredded into chips, roughly the size of a dollar bill, which get sucked into the system and routed via a series of computer-controlled gates to a multi-tonne pile in the back of a semi-trailer.

“The system automatically knows which of the four different grades of alloy is being stamped at a given time, then it routes the material into one of four trucks standing by to send it back for reprocessing,” says Conrad.

As Ford expands the use of aluminium in its product line-up, closed-loop recycling systems will be essential to the long-term viability of lightweight materials and meeting overall sustainability targets.

Outokumpu’s stainless steel for maintenance-free boat

Outokumpu has supplied mirror-polished stainless steel plates in different dimensions for a P16 prototype offshore patrol vessel made by Swedish Steel Yachts AB (SSY). The boat is made entirely of super duplex stainless steel that has very high corrosion resistance to cope with the marine environment.

The P16 was built using an innovative design concept inspired by the features of a traditional Viking boat. The design, together with the material choice, made it possible to build an extremely lightweight ship: the high strength of the duplex stainless steel allowed a reduction of thickness in the material used.

“The lightness of the P16 clearly reduces fuel consumption. The ship is maintenance-free, which saves precious time and money. It is extremely resistant to salt water, and can even be used when the sea is partly frozen – a useful feature in the Scandinavian waters,” said Petra Rosén, head of marketing at SSY.

Rosén added: “The idea is to find solutions for some of the key challenges in the boatbuilding industry and to provide more efficient, safer and greener ships for the future. This project can potentially open a whole new market for high-performance and sustainable vessels of this type.”

For the prototype, SSY selected Outokumpu’s Forta SDX 2507 super duplex stainless steel. “It is the only option with the product qualities the end-users require. It is high-strength, durable, 100% corrosion resistant, and maintenance-free with very good tensile strength,” said Rosén.

Ford is now recycling 5 million pounds (about 2,268 tonnes) of aluminium scrap a week into material that can be used to build new pickup trucks

Posco’s new Steel Forming Laboratory

Posco says it has constructed it new Steel Forming Laboratory in Songdo to “raise the level of solution marketing”.

The company’s existing Steel Forming Laboratory will be exclusively in charge of evaluation of the basic physical properties required by customers (forming, welding, coating, corrosion and fatigue, and providing basic customer support such as quality certification), whereas the new Steel Forming Laboratory will be responsible for more differentiated tasks (providing application technology solutions involving steel products).

The new laboratory possesses various facilities, including roll forming and press, to evaluate formability of newly developed steel products such as Posco’s Giga Steel and develop forming technologies ahead of customers. In addition, equipment such as a high-speed crash tester, a full-scale fatigue tester, and a wheel durability evaluator can evaluate the impact and durability of moulded parts for automobiles, and it also has the capability to provide customised analysis results using 3D scanners.

The company is using this equipment to implement its ‘Posco One-Stop Development’ system, which makes it possible to perform all the processes from the development of application technologies for steel products to production verification without the involvement of customers, further reinforcing its solution marketing.

Posco is able to evaluate formability, which is essential for selection by steel products, on behalf of customers.
### Monthly Prices

#### Aluminium Averages

<table>
<thead>
<tr>
<th>Material</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium 1050</td>
<td>1,745.00</td>
<td>1,822.50</td>
</tr>
<tr>
<td>Aluminium 1060</td>
<td>1,700.00</td>
<td>1,775.00</td>
</tr>
<tr>
<td>Aluminium 1070</td>
<td>1,650.00</td>
<td>1,725.00</td>
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#### Magnesium

<table>
<thead>
<tr>
<th>Material</th>
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<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium</td>
<td>8,850.00</td>
<td>9,950.00</td>
</tr>
<tr>
<td>Magnesium</td>
<td>8,810.00</td>
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</tr>
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#### Germanium Dioxide

<table>
<thead>
<tr>
<th>Material</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germanium Dioxide</td>
<td>375.00</td>
<td>425.00</td>
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#### Tin

<table>
<thead>
<tr>
<th>Material</th>
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</thead>
<tbody>
<tr>
<td>Tin</td>
<td>15,000.00</td>
<td>17,250.00</td>
</tr>
<tr>
<td>Tin</td>
<td>15,000.00</td>
<td>17,250.00</td>
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#### Nickel

<table>
<thead>
<tr>
<th>Material</th>
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<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>8,820.00</td>
<td>9,950.00</td>
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<tr>
<td>Nickel</td>
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#### Molybdenum

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Molybdenum</td>
<td>15,000.00</td>
<td>17,500.00</td>
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<tr>
<td>Molybdenum</td>
<td>15,000.00</td>
<td>17,500.00</td>
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</table>

#### LME Settlement Conversion Rates

<table>
<thead>
<tr>
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<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>LME Settlement</td>
<td>1.29</td>
<td>1.30</td>
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</table>

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June averages

<table>
<thead>
<tr>
<th>Metal</th>
<th>Low</th>
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<tbody>
<tr>
<td>Aluminium</td>
<td>84.59</td>
<td>111.18</td>
</tr>
<tr>
<td>Aluminium Po2, in-warehouse premium</td>
<td>111.18</td>
<td>130.19</td>
</tr>
<tr>
<td>Alumina</td>
<td>103.71</td>
<td>120.00</td>
</tr>
<tr>
<td>Antimony</td>
<td>305.28</td>
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</tr>
<tr>
<td>Bismuth</td>
<td>5.07</td>
<td></td>
</tr>
<tr>
<td>Cadmium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cobalt</td>
<td>79.22</td>
<td>99.99%</td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germanium Dioxide</td>
<td>120.25</td>
<td>121.25</td>
</tr>
<tr>
<td>Gold</td>
<td></td>
<td></td>
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<tr>
<td>Germanium Dioxide</td>
<td>78.79</td>
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<td>Gold</td>
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<tr>
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<tr>
<td>Lead</td>
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</tr>
<tr>
<td>Lead</td>
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<td>2,138.19</td>
</tr>
<tr>
<td>Nickel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molybdenum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molybdenum</td>
<td>1,400.00</td>
<td>1,400.00</td>
</tr>
<tr>
<td>Nickel</td>
<td>217.22</td>
<td>217.22</td>
</tr>
<tr>
<td>Palladium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platinum</td>
<td></td>
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<tr>
<td>Platinum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tin</td>
<td>2,571.55</td>
<td>2,571.55</td>
</tr>
<tr>
<td>Tin</td>
<td>2,571.55</td>
<td>2,571.55</td>
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<tr>
<td>Tin</td>
<td>2,571.55</td>
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<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Location</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2a Excelencia Estratégica en la Minería</td>
<td>29 - 30 August 2017</td>
<td>Chile</td>
<td>Launched in 2016, this event provides the opportunity to hear first-hand from the leaders of the South American mining industry and learn from their experience.</td>
</tr>
<tr>
<td>16th International Stainless and Special Steels Conference</td>
<td>5 - 7 September 2017</td>
<td>Ljubljana, Slovenia</td>
<td>With three days of expert content and two field trips for both flat and long products planned for 2017, this conference continues to be a prime event for all those involved in the stainless and special steel markets.</td>
</tr>
<tr>
<td>North American Ferro-alloys Conference</td>
<td>7 - 8 September 2017</td>
<td>Chicago, USA</td>
<td>In 2016, more than 150 delegates from companies across the industry spectrum, including raw material buyers from major steel producers in the region, attended the inaugural event dedicated to the North American ferro-alloys industry.</td>
</tr>
<tr>
<td>11th International Steel Tube &amp; Pipe Forum</td>
<td>12 - 13 September 2017</td>
<td>Abu Dhabi, United Arab Emirates</td>
<td>Speakers will analyse the global and regional demand drivers for oil &amp; gas and pipeline projects. Attendees will also be given insight into Iranian steel tube and pipe projects and trade feasibility.</td>
</tr>
<tr>
<td>22nd Galvanizing &amp; Coil Coating Conference</td>
<td>13 - 14 September 2017</td>
<td>Abu Dhabi, United Arab Emirates</td>
<td>An event focused specifically on the commercial and technical aspects of the coated flat steel market. This year’s conference will include a workshop with Unicoil and an optional field trip to Al Ghurair Iron &amp; Steel LLC, the steel cold rolling and galvanizing complex in the UAE.</td>
</tr>
<tr>
<td>Automotive Supply Chain Conference</td>
<td>18 - 19 September 2017</td>
<td>Dearborn, Michigan, USA</td>
<td>With more than 85 companies in attendance, including OEMs and manufacturers of steel, aluminium and various composite materials, this is the best opportunity to network with the entire automotive supply chain from across North America and Mexico.</td>
</tr>
<tr>
<td>32nd International Aluminium Conference</td>
<td>25 - 27 September 2017</td>
<td>Manama, Bahrain</td>
<td>With more than 400 delegates in attendance each year, this event is essential for all those involved in the global aluminium supply chain. Key decision makers from over 240 companies and 52 countries attended in 2016.</td>
</tr>
<tr>
<td>5th Asian Nickel Conference</td>
<td>27 - 28 September 2017</td>
<td>Manila, Philippines</td>
<td>The biggest Asian event for the global nickel industry, the 2016 conference welcomed more than 100 delegates from over 70 companies from around the globe.</td>
</tr>
<tr>
<td>Aluexpo 2017</td>
<td>5 - 7 October 2017</td>
<td>Istanbul, Turkey</td>
<td>In addition to aluminium products, Aluexpo also includes machinery, equipment, raw materials and consumables manufactured by domestic and international suppliers.</td>
</tr>
<tr>
<td>31st Stainless &amp; its Alloys Conference</td>
<td>25 - 26 October 2017</td>
<td>Pittsburgh, USA</td>
<td>More than 120 delegates from over 80 companies attend this conference each year as it brings together the North American stainless steel industry to discuss market drivers that will shape the industry in the year to come.</td>
</tr>
<tr>
<td>LME Week Seminar</td>
<td>30 October 2017</td>
<td>London</td>
<td>The seminar opens LME Week and covers all aspects of the ever-changing market including the global economy, market trends and issues facing the metal industry today.</td>
</tr>
<tr>
<td>21st Arab International Aluminium Conference (ARABAL)</td>
<td>6 - 9 November 2017</td>
<td>Muscat, Oman</td>
<td>ARABAL has become an internationally recognized event attended by a broad spectrum of industry leaders, top executives as well as key investors, major suppliers and manufacturers from over 150 global companies. This year’s conference will focus on driving strategic growth across the global aluminium industry.</td>
</tr>
<tr>
<td>Metal–Expo 2017</td>
<td>14 - 17 November 2017</td>
<td>Moscow, Russia</td>
<td>Last year’s Metal–Expo saw over 500 companies, including steel producers, tube and pipe manufacturers, and steel product distributors, from 32 countries participate in the event.</td>
</tr>
<tr>
<td>25th International Recycled Aluminium Conference</td>
<td>15 - 16 November 2017</td>
<td>Warsaw, Poland</td>
<td>An industry gathering dedicated to aluminium recycling dynamics, this conference has become the hub for decision makers from commercially and technically focused companies throughout the industry.</td>
</tr>
<tr>
<td>33rd International Ferro-alloys Conference</td>
<td>19 – 21 November 2017</td>
<td>Lisbon, Portugal</td>
<td>Europe’s largest gathering of the global ferro-alloys market, this event brings together over 600 industry professionals for three days of networking and constructive discussion about the international ferro-alloys market.</td>
</tr>
<tr>
<td>13th Asia Copper Conference</td>
<td>29 - 30 November 2017</td>
<td>Shanghai, China</td>
<td>Part of CESCO Asia Copper week and scheduled alongside the CESCO Asia copper dinner, this event gives delegates access to more than 2,000 copper industry professionals from around the world.</td>
</tr>
</tbody>
</table>
The past year has seen a pick-up in Chinese government activity to close excess capacity in steel and base metals — particularly for aluminium. In aluminium, over a quarter of Chinese capacity has been declared illegal or in violation of environmental laws. Over 2 million tpy of “illegal” stainless steel capacity has been closed over the past year — although some is about to re-open — and in carbon steel, following up to 90 million tpy of capacity closures last year, a further 50 million tpy is on course to be closed in 2017.

Analysts who have watched Chinese developments over the past 20 years could be forgiven for viewing these developments cynically — so many times in the past, announcements by the central government to curtail capacity were often ignored by local governments and producers and proved to be largely ineffective.

The cynics would also note that record highs in Chinese steel and aluminium production (see chart) have been recorded in recent months. In aluminium, there is some evidence that producers have been ramping production up ahead of closures to establish a higher watermark from which to make ordered cuts.

It is actually just as well that the central government was ignored in the past since Chinese domestic demand almost always grew faster than the government expected. In the initial phase of China’s rapid growth in the early 2000s, Chinese net imports for stainless and carbon steel and aluminium grew rapidly as the government succeeded in curtailing expansions by the large state-owned enterprises (SOEs).

This led to large price rises for these commodities and the high profits attracted a flood of investment by the ‘private’ sector in China, dramatically reducing the market share and importance of SOEs over time.

What drove the huge rates of investment in private-sector capacity were massive efficiencies in building new capacity. Often new capacity in China had capital costs that were as low as one-fifth the cost of capacity built elsewhere in the world. In addition, the capacity was often built in under a year, whereas in the rest of the world new builds took five years or more to reach commissioning stage. A major factor in understanding how great these advantages were was that so much identical new capacity was being built that massive economies in building them arose.

Once capacity is commissioned in China, the ramp-up to full capacity is often rapid (3-6 months maximum), whereas plants often take years to reach full capacity outside China — another advantage of using the experience of similar plants previously commissioned.

Local governments were always extremely supportive in providing financial help and helping to build infrastructure for new producers. This interaction of local governments with private owners is why some Western observers see these ‘private-sector’ producers as state-owned to a certain extent.

From a financial perspective all these advantages have made investment in new capacity extremely economical in China. In addition, massive efficiency gains were achieved in each new generation of capacity (especially in aluminium) and new capacity typically has significantly lower operating costs than older capacity.

In a sense, capital costs (and depreciation) are trivial costs in China — with capacity pay-back achieved in a handful of years — when compared to the rest of the world, so the motivation to build new lower cost and more efficient capacity remains today, even as demand growth rates in China have slowed in recent years. Excess production has found its way into export markets.

Declining or disappearing profitability for less-efficient SOEs amid growing over-capacity, along with the threat of increasingly draconian anti-dumping duties and outright trade bans, has finally forced the hand of the government in a more serious fashion over the past year. A secondary consideration, but certainly one of growing importance, has been environmental concerns — a rich country’s concern more than that of a poor one, and China is increasingly rich, especially in the coastal cities.

The central government has moved rapidly to close so-called “illegal” capacity — capacity that has been built without proper permitting — and also is enforcing existing and tighter environmental standards more rigorously than in the past. The coming winter should see large-scale closure of aluminium capacity for environmental reasons, and polluting blast furnace pig iron capacity is being shut in and around Tangshan.

There is also growing evidence of serious restrictions being placed on mining capacity growth for environmental reasons. For example, despite recent high prices, new Chinese zinc mines are finding it harder to get up and running this year than they would have at almost any other time over the past 20 years.

Arguably the most successful curtailment policy in the past year has been in the Chinese coal industry, where supply fell by 5-10% nationally last year due to the reduction in the number of annual working days at most mines from 330 to 276 days in 2016. This led to a strong recovery in coal prices and a dramatic improvement in the financial position of the Chinese industry. It also led to a surge in imports, attracted by better domestic Chinese prices, particularly in steam coal.

While there is growing evidence that the central authorities have increased their influence over national supply and that local authorities are falling in line, we are still awaiting conclusive evidence that supply curtailments announced in steel and aluminium will make a major difference to global supply-demand balances for these commodities. The next six months will provide some of the answers.
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