

March 2020

# Metal Market Magazine



## Learning from leaders along the supply chain



Insights from a year  
of cover profiles

Tube & pipe trends

Oilfield mineral  
developments

New plant orders

# Steel Success Strategies 2020

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## Key Speakers:

**David Stickler,**  
CEO,  
Big River Steel

**Sanjeev Gupta,**  
Chairman,  
GFG Alliance

**Leon Topalian,**  
CEO,  
Nucor

**Lourenco Goncalves,**  
Chairman, President &  
CEO, Cleveland-Cliffs

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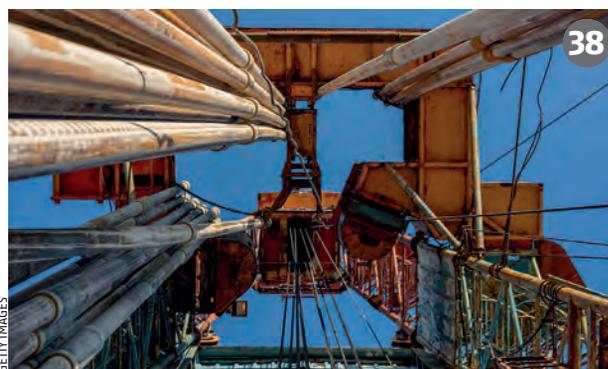
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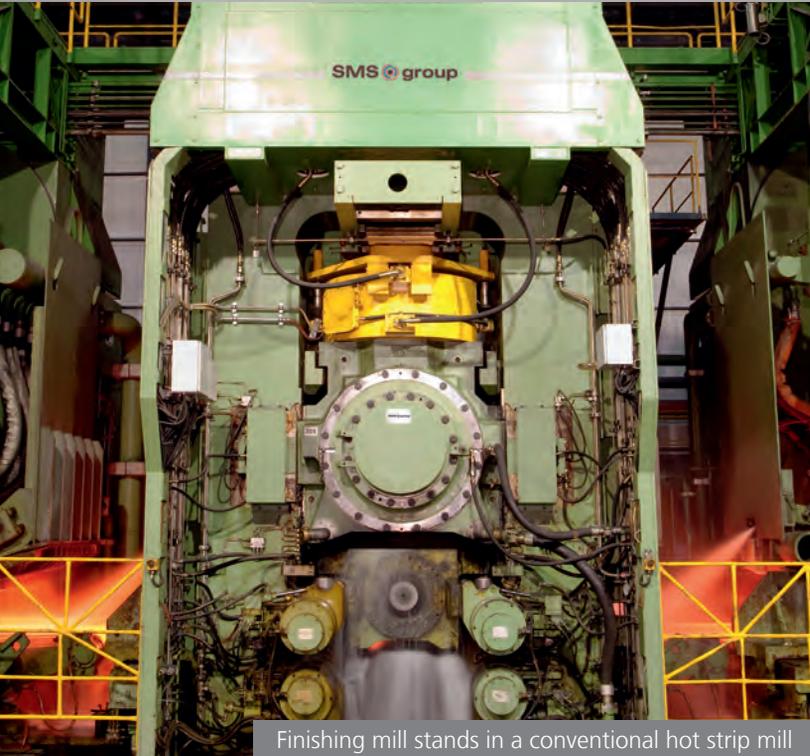
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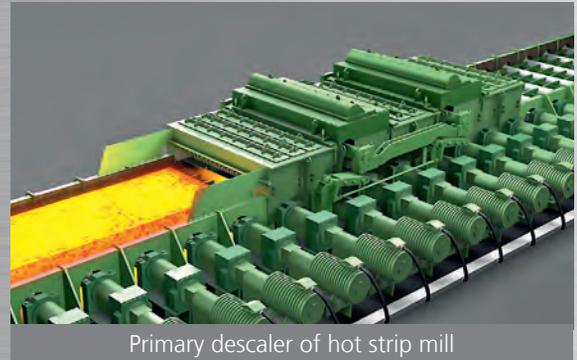
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# WHO KNOWS THE SECRET OF HOT STRIPS?



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## More on leadership

**O**ur cover profile interviewees over the past 12 months have come from throughout the steel and metals supply chain, including non-ferrous metal mining, steel and aluminium production, and metal processing technology, through to scrap metal recycling and manufacturing of the latest plant and equipment to achieve that. Leaders from the financial sector have also featured.

Within the personal stories that each interviewee has told, several factors that have contributed to their success have recurred. High academic achievement, the strong support of family and a willingness to take on new roles and challenges internationally are among them.

Other factors include a persistent drive to keep finding new opportunities and to learn from the many challenges faced in the course of a career, a talent for communicating well with colleagues and a willingness to embrace new technology.

Those elements contributing to leadership may not surprise, but if any evidence of their importance were needed, our cover stories over the past year have provided plenty of it. Our annual profile review of cover interviews included in this issue of the magazine summarizes the stories from the past year's issues to highlight some of the key experiences and insights on leadership, management and strategy that they contained.

Our feature sections this month include overviews of trends in the global and US tube & pipe markets, together with examples of recent new production projects.

In related markets, the industrial minerals section of this issue looks at the fortunes of oilfield minerals. It also considers the impact of the outbreak of novel coronavirus in China on industrial minerals markets and on fluorspar and acidspar in particular.

A bonus feature on Indian ferro-alloys looks in depth at the interplay between domestic and international markets for ferro-chrome ore and alloys and the effects that competing interests and government policy are having.

Our regular pages include steel and base metal market analysis from our experts in Fastmarkets MB research, a list of new international plant orders, plus examples of the latest innovations in metal products, technologies and their end-use markets.

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# Metal Market Magazine

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 **Fastmarkets**

# News review: non-ferrous

## Ball Corp announces higher earnings

Ball Corp announced higher year-on-year earnings despite lower overall sales in 2019; the Bloomfield, Colorado-based company's net earnings rose by 24.7% versus 2018.

"We finished 2019 on a strong note... Over the past year, our global beverage volumes increased 5%, our aerospace contracted backlog increased 14% and we were able to sell underperforming assets," chairman, president and chief executive officer John A. Hayes said in a statement on February 6, noting that demand for aluminium packaging continues to outstrip supply.

The company reported full-year net earnings of \$566 million in 2019, compared with \$454 million in 2018. But net sales were lower year on year at \$11.47 billion, compared with \$11.64 billion in the full year 2018.

## Vale lowers nickel output guidance

Brazilian multi-metal miner Vale has revised its 2020 nickel production guidance to 200,000-210,000 tonnes per year from 240,000 tpy previously amid its projected "exit" from the Vale New Caledonia (VNC) operations, the company announced on February 11.

The lower 2020 production guidance comes after Vale indicated that operations at VNC would cease entirely by the end of April 2020, while the company looks to review its strategy in the region, not precluding the possibility of selling the asset.

## Enertopia in talks for JVs or other strategic alliances

Enertopia Corporation (ENRT) is continuing to explore strategic business combinations and is in early talks about joint ventures or other strategic



Enertopia at Clayton Valley, Nevada, is working on technology designed to produce battery-grade lithium carbonate from brines or create a synthetic brine

alliances in the clean energy sector, the company said on February 11.

These talks have included ways to monetize future production from the company's lithium project in Clayton Valley, Nevada, and, if successful, would allow ENRT a non-dilutive path for the next step forward, it noted.

At Clayton Valley, ENRT is working on technology designed to produce battery-grade lithium carbonate from brines or create a synthetic brine.

## Coronavirus outbreak supports Chinese alumina prices

China's alumina price is on an upward trend after many alumina refineries reduced production, following transportation difficulties since the Wuhan coronavirus outbreak restricted their coal and bauxite supply, several sources told Fastmarkets on February 10

Despite a bullish sentiment in the market, some alumina analysts think the uptrend may not last long because China still has a lot of alumina inventory at its Lianyungang, Qingdao and Bayuquan ports and is

continuing to import from overseas.

## Sigma Lithium's Xuxa plant to start construction in June

Sigma Lithium Resources is scheduled to begin construction of its "green" open-pit mine and lithium concentrator at the Xuxa deposit in Brazil's southeastern state of Minas Gerais in June.

The facility, which will have an initial lithium concentrate capacity of 220,000 tonnes per year, will start producing battery-grade, 6%-lithium spodumene concentrate from June 2021.

Capacity will then be ramped up to 440,000 tpy in 2022, Sigma Lithium's chief strategy officer Ana Cabral-Gardner told Fastmarkets

## SDI LaFarga breaks ground on new furnace

SDI LaFarga is moving ahead with the planned addition of a new shaft furnace at its facility in New Haven, Indiana, in a \$16-million expansion.

The new furnace will more than double the plant's capacity – increasing output by 250 million pounds per year – and

support production of electrolytic tough pitch (ETP) copper rod.

The company will hire 25 new employees to support the expansion, with the new furnace expected to begin processing cathodes from September 1, the company confirmed to Fastmarkets.

## Aurubis Cu cathode output fell during maintenance

Aurubis' copper cathode output dropped by nearly 15% in the fiscal first quarter after the European company conducted planned maintenance at its main smelter in Hamburg, Germany.

Cathode output totaled 234,000 tonnes in the October-December quarter, down by 14.6% from 274,000 tonnes in the same 2018 period. The shutdown negatively affected Aurubis' revenue by around €34 million (\$37 million), the company said

## Antimony gains support in Europe amid coronavirus uncertainty

The impact of the coronavirus outbreak from Wuhan city, China, is positively affecting

antimony prices in Europe, with low stocks in Rotterdam and the market heavily dependent on supply from China.

China accounts for 78% of global antimony output, according to the United States Geologic Survey (USGS).

## JW finishes Goose Creek Al plant expansion

JW Aluminum has completed construction at its plant in Goose Creek, South Carolina, with production set to ramp up once equipment installation is finished. The flat-rolled aluminium producer also plans to close its St Louis-based plant.

The company expects production to begin in the third quarter of 2020, and will gradually ramp up output to its project capacity of 175 million lbs per year when the expansion enters its second phase, the company said.

## Codelco taps Ventanas manager for VP role

Chilean state-owned copper producer Codelco has appointed José Sanhueza Reyes, currently general manager of the Ventanas division, to the newly created role of smelter and refinery vice president, the company announced.

The promotion will be effective on March 1, when Reyes will become responsible for all refining operations at the Chuquicamata, Salvador, Ventanas and El Teniente divisions, Codelco added.

The smelter manager at El Teniente, Gerardo Sánchez Sepúlveda, will take Reyes' place at Ventanas.

## Hanwa expects \$59mln loss on Samancor stake

Hanwa expects to incur an annual loss of more than ¥6.5 billion (\$59 million) on its 20% stake in Samancor amid challenging ferro-chrome market conditions, the

Japanese trading house said on February 12.

Difficulties facing the South African ferro-chrome producer have led Hanwa to review Samancor's business plans and its interests in the company, the trading house said.

## Rio Tinto will review future of unprofitable ISAL smelter

Rio Tinto will conduct a strategic review of its ISAL smelter in Iceland, due to high energy costs and historically low aluminium prices, the company said on February 12.

The review, due to complete in the first half of the year, will consider options including curtailment and closure of the smelter, which has capacity of 212,000 tonnes per year.

## GEM to prioritize overseas bookings amid Hubei lockdown

Chinese battery materials producer GEM will prioritize delivering cargoes to overseas buyers in February amid the large-scale lockdown in Hubei province following the outbreak of the novel coronavirus, a company source told Fastmarkets.

GEM's Jingmen plant is located in Jingmen city, Hubei province, which has been heavily affected by the coronavirus outbreak. The plant is unable to resume operations, but the company's stocks of nickel-cobalt-manganese (NCM) battery precursor materials can mostly cover overseas bookings for February, according to the source.

## Shift in UK's EV policy to boost battery demand

The British government has brought forward a ban on the sale of internal combustion engine cars in a move which will boost demand for battery materials, including lithium.

UK Prime Minister Boris



SHUTTERSTOCK

## A UK ban on the sale of internal combustion engine cars from 2035 will boost demand for lithium battery materials

Johnson unveiled the new date at a launch event for a United Nations climate change gathering. The date of the ban has been moved to 2035 from 2040.

The ban will now include hybrids, which have both a battery and an internal combustion engine. A government spokesperson confirmed to Fastmarkets that the ban will also include plug-in hybrids.

## Greek government tables Larco restructuring plan

The Greek government tabled a plan on February 10 to restructure and subsequently sell the majority state-owned multi-metal company Larco, one of Europe's largest ferro-nickel producers.

Greek authorities plan to place the mineral and metallurgical industry into a clearance management situation and immediately launch a tender for the sale of Larco's factory and mines within 12 months.

The company has a 50-tonne-per-day, or 18,000-20,000-tonnes-per-year, ferro-nickel production capacity across several

domestic mines and smelting plant that may come offline unless the tender is satisfactorily completed.

## Alcoa gets ASI chain of custody certification

Alcoa Corp has been certified by the Aluminium Stewardship Initiative (ASI) to market products under ASI's chain of custody standard.

It marks another step in the drive by the company toward sustainable manufacturing practices and is in line with its strategic goal of becoming the lowest emitter of carbon dioxide (CO<sub>2</sub>) among the world's major aluminium smelters over the next five years.

In October last year, Alcoa launched a multi-year review of its aluminium portfolio, placing roughly half of its global smelting capacity under scrutiny for potential curtailment or closure.

The chain of custody certification covers three key areas of the supply chain: from the mine to aluminum casthouse, from scrap to casthouse, and semi-fabrication and manufacturing to final product.

# News review: steel

## Tosyali Algeria plans to start HRC production

Tosyali Algeria plans to start production of hot-rolled coil (HRC) by the end of 2022 and is targeting output of 2 million tonnes per year, a company spokesperson told Fastmarkets on February 14.

The steelmaker will mainly supply the material to automotive and white goods manufacturers, as well as to pipe makers, and the packaging and construction industries.

Tosyali Algeria will focus on the domestic market to meet strong demand for HRC, market sources said.

## Plymouth buys Nisshin Automotive Tubing

Plymouth Tube Co has purchased Nisshin Automotive Tubing LLC (NAT), the company said on February 7. The acquisition of Versailles, Kentucky-based NAT from Nippon Steel Nisshin Holding Inc is aimed at increasing capabilities and participation in automotive tubing, Plymouth Tube said. The terms and price of the transaction were not disclosed.

## GFG completes steel plant buys in India

GFG Alliance has completed its acquisition of Adhunik Metaliks and Zion Steel in a 4.25-billion-rupee (\$60 million) cash deal, marking its entry into the Indian steel market, the company said on February 18.

Adhunik is an integrated steel plant in the Indian state of Odisha. It has a blast furnace and electric-arc furnace (EAF) with steelmaking capacity of 500,000 tonnes per year, as well as a 34 MW captive power plant. It produces ferro-alloys, billet, bar and rounds.

Adhunik, along with Zion Steel, its associated steel-rolling facility, has a combined rolling capacity of 400,000



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**Target markets for Tosyali Algeria's planned hot-rolled coil production include white goods manufacturers**

tpy. The sites produce products for the automotive, energy, engineering and oil and gas sectors.

## Hyundai Steel reports decline in operating profits

South Korean steelmaker Hyundai Steel reported an almost 70% decline in operating profits in 2019, amid tightening margins between its raw materials buying prices and steel sales prices. The company's operating profit of 331.3 billion Won (\$277 million) in 2019, was down by 67.7% year on year.

Hyundai also experienced muted demand for long steel in 2019, it said, with low demand for construction in the Korean domestic market during the second half of the year reducing sales volumes and prices for rebar.

## Warrior Met Coal to develop 3.9m tonne project in US

US-based metallurgical coal producer Warrior Met Coal has announced plans to develop a hard coking coal project in Alabama with a capacity of 3.9 million tonnes per year, through an investment of around \$550-600 million over the

next five years.

The company expects the development of the Blue Creek project to produce 4.3 million short tons per annum – 3.9 million tonnes – of premium high-vol A metallurgical coal over the first 10 years of production, the company said on February 19.

## Ternium takes cautious approach to making acquisitions

Latin American steelmaker Ternium plans to analyze possible acquisitions or mergers cautiously, chief executive officer Máximo Vedoya said on February 19. "Although the market is looking better in 2020, there is currently a lot of uncertainty in the markets, so we need to be extremely cautious when we analyze mergers and acquisitions," Vedoya said during a conference call with analysts to discuss the company's 2019 financial results.

## Nucor mulls \$300m expansion in SC

Nucor Corp is proposing a \$300-million expansion of its flat-rolled and steel beam mill near Charleston, South Carolina, and additional expansions could also be in the works, a company

spokesperson told Fastmarkets.

"Nucor has been considering a \$300-million expansion project at our Berkeley County mill, along with two other Nucor locations," the spokesperson said on February 13. "Several factors are still being examined before a final decision is made."

## Russel sees weak Q1 OCTG, line pipe demand

Weak demand in the energy sector during the first quarter is likely to keep prices low for oil country tubular goods (OCTG) and X52 line pipe, according to Russel Metals Inc chief executive officer John G. Reid.

"The mills are now carrying more inventory than they've [ever] carried. So they're competing with distribution when there's a downturn that compounds it. End users have been taking longer positions because of the mill programs. So we're competing with end users [who] are now selling into the market," Reid said during a question-and-answer session on the company's fourth-quarter and full-year 2019 earnings results on February 12.

## WTO paralysis may create steel price disparity

A block on the World Trade Organization's dispute settlement process has paralyzed progress in steel cases, including those pertaining to Section 232, which could result in a disparity between steel prices in the United States and those in the rest of the world, according to two trade experts.

The US has prevented WTO appellate body members from hearing appeals and handling disputes by refusing to give its consent to fill empty seats, according to Jack Caporal, an associate fellow with the Scholl Chair in International Business

at the Center for Strategic and International Studies.

## Eurofer sees slim consumption recovery in 2020

European steel association Eurofer forecasts a modest recovery in apparent steel consumption in 2020, with risks relating to import volumes, Eurofer said on January 30.

No significant rebound is expected before the second quarter of 2020, Eurofer said. EU apparent steel consumption fell by 3.1% year on year to 37.2 million in the third quarter of 2019. The stock cycle continued to be negative that quarter, which further affected the negative trend in final steel use.

## EC starts second review of steel safeguard measures

The European Commission (EC) has initiated a review of existing safeguard measures into a number of imported steel products, it said on February 15. The EC had already initiated a first review of the measures in May 2019 and imposed reviewed measures in late September 26. The EC imposed the definitive safeguard measures on January 31, 2019.

The definitive safeguard measures applied to a list of imported steel products, in the form of 25% tariff rates and a range of quotas that are partly annual and country-specific,

and partly quarterly and global.

Products under the review are 28 steel products categories, including hot-rolled (HR), cold-rolled (CR) and hot-dipped galvanized (HDG) coil, heavy plate, rebar and wire rod.

## ArcelorMittal Poland plans restart in Krakow

ArcelorMittal Poland plans to restart primary operations at its flat steel plant in Krakow in late March 2020, the company said. The steelmaker idled the blast furnace and halted steelmaking operations at the end of November 2019 due to “deteriorating market conditions”.

“The decision to restart is [being] driven by the need for supplies of slab to [our] plant at Gent [in Belgium] where a blast furnace relines is planned, and to mitigate production losses at other ArcelorMittal Europe plants,” ArcelorMittal Poland’s chief executive officer Marc De Pauw said on February 3.

## AK, Cliffs expect to seal merger in March

Cleveland Cliffs and AK Steel expect to finalize their merger agreement earlier than expected, the companies said.

Cleveland Cliffs and AK Steel expect the merger, announced in December, to close on March 13, they said in a joint release issued on February 11.

The deal, valued at about

\$1.1 billion, was originally slated to be completed during the first half of this year. It will combine an integrated specialty steelmaker and the United States’ sole iron ore miner, and could mean potential changes in the market.

## Sail reports loss despite higher sales and production

A summary of state-owned Steel Authority of India’s (Sail) financial results for its third quarter covering the period of October to December, and the first nine months of its financial year 2019-20, reported higher sales and saleable steel production in the third quarter, but lower prices hurt earnings.

Earnings before interest, taxes, depreciation and amortization (Ebitda) to Q3 FY20 was at 11.84 billion rupees (\$165.19 million), down from 26.53 billion rupees year on year, and 13.22 billion rupees quarter on quarter.

“Despite lower steel prices amidst stiff competition during the third quarter, we could achieve significant growth in sales and saleable steel production. The recent improvement in market conditions combined with the efforts towards cost reduction, we are hopeful of doing better in the fourth quarter,” Shri Anil Kumar Chaudhary, Chairman at Sail, said.

## Vale lowers Q1 2020 iron ore fines output guidance

Brazil-based miner Vale has lowered its iron ore fines production guidance for the first quarter of 2020 after its operations were adversely affected by heavy rain, the company said on February 11.

Vale said it was expecting to produce 63-68 million tonnes of iron ore fines in the January-March period, down

by 5 million tonnes from an earlier estimate of 68-73 million tonnes.

The miner suffered production losses amounting to 1 million tonnes due to heavy rainfall at its mining operations in Brazil’s southeastern region in January and February, according to its production report.

## NLMK USA sees sales and revenue decline in Q4

NLMK Group’s earnings declined in the fourth quarter of 2019, the Russian steelmaker announced on February 12, citing weak demand and softening steel prices affecting its operations in the United States.

For the full year 2019, US sales decreased by 3.5% to 2.21 million tonnes from 2.29 million tonnes in 2018.

NLMK attributed a 19.6% year-on-year decrease in the segment’s full-year 2019 revenue to a steel price adjustment in the US market.

NLMK USA also reported an earnings before interest, taxes, depreciation and amortization (Ebitda) loss of \$37 million for 2019, compared with Ebitda of \$253 million in 2018.

## Steel Dynamics Inc targeting market share

Steel Dynamics Inc targeting market share Steel Dynamics intends to expand market share for flat-rolled steel in the United States in addition to growing its exports to Mexico next year when its new \$1.9-billion electric arc furnace facility in Sinton, Texas, is completed.

## Worthington to shutter Wooster, Ohio, facility

Worthington Industries will consolidate its oil and gas equipment manufacturing operations in Wooster, ▶



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EC products under a review of existing safeguard measures include HR, CR and HDG coil, heavy plate, rebar and wire rod



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# News review: steel

Ohio, with its facility in Bremen, Ohio, the company announced on February 12.

The decision will help utilize available capacity at the Bremen facility, which manufactures similar products, the Columbus, Ohio-based company said in a statement. Over half of the Wooster facility's 122 workers will have the opportunity to transfer to Bremen.

The close of Wooster's operations should be completed by May 31, 2020.

## Cisa asks for government help with logistical problems

The China Iron & Steel Association (Cisa) is seeking the Chinese transport ministry's help to solve logistical problems experienced by steelmakers in recent weeks — especially those affecting the delivery of raw materials, market sources told Fastmarkets.

Various transportation restrictions have been put in place throughout China since late January as a result of the outbreak of the novel coronavirus (2019-nCoV) in the country.

These, coupled with government instructions for companies to delay the restart of business after the Chinese New Year break in the final week of last month, resulted

in a major shortage of truck drivers.

## Usiminas FY adjusted earnings fall 27%

In a summary of Brazilian flat steel producer Usiminas' earnings in 2019, the company's adjusted Ebitda at Usiminas dropped by 27% year-on-year to 1.97 billion Reais, which reflected a fall in steel sales over last year, mainly due to a reduction in steel exports.

The company also faced an increase of 9.9% in its average cash cost per tonne in its steel business because of higher raw material costs. These effects were partially compensated by higher average steel sales prices in 2019, according to the company.

Iron ore sales at Usiminas' 74%-owned mining subsidiary rose mainly due to higher exports of the steelmaking raw material. Usiminas' mining unit exported 4.63 million tonnes of iron ore last year, up by 41% from the previous year.

The company is optimistic about the performance of the steel sector in 2020, expecting demand for its products to increase in line with the latest forecast from the country's steel association, Aço Brasil, which sees growth in Brazilian steel consumption of 5.2% this year.

## BlueScope to install new EAF in Ohio

North Star BlueScope plans to install a new meltshop at its facility in Delta, Ohio, and to commission it by the end of 2021, Fastmarkets understands.

The new facility will feature a single-bucket charge, 195-ton electric-arc furnace (EAF), to be built by Danieli Group, the Italian mill and equipment supplier announced on February 14.

"Because this is a single-charging furnace, it will save energy and promote melting efficiency," a Danieli representative told Fastmarkets.

## Rio Tinto lowers iron ore shipment guidance for Pilbara

Anglo-Australian iron ore miner Rio Tinto has lowered its iron ore shipment guidance following infrastructure damage across its Pilbara operations in Western Australia.

The miner now expects shipments of 324-334 million tonnes in 2020, down from a previous guidance of 330-343 million tonnes, it said on February 17.

"Rio Tinto's iron ore operations in Pilbara, Western Australia, are progressively resuming following the passing of tropical cyclone Damien," the company said.

## BHP predicts iron ore price volatility

The outbreak of the novel coronavirus (2019-nCoV), intra-year demand volatility and seaborne supply uncertainty are likely to contribute to iron ore price volatility in the coming year, Australia miner BHP said.

"If Covid-19 is effectively and demonstrably contained within the March quarter, we expect that an accelerated

run-rate in the construction and manufacturing sectors for the remainder of the year can make up for the loss of activity at the outset of the year," BHP said in its outlook report.

## Stelco shifts BF relines, pig iron plant to H2

Stelco will move a planned relines of its Lake Erie blast furnace, along with the completion of its 1-million-ton-per-year pig iron plant, to the second half of this year, the company's top executive said.

"Previously we noted our intent to proceed with the relines of our blast furnace at Lake Erie Works [in Nanticoke, Ontario] in the second quarter of 2020. However, in response to current strong market demand, along with materially improved prices in the near term, we are electing to commence the relines and commission our new pig iron caster in the second half of this year," chief executive officer David Cheney said on February 18 in commentary accompanying the company's fourth-quarter earnings results.

## MRC Global expects lower activity in 2020

Spending levels from customers led to a decline in earnings in the fourth-quarter 2019, according to MRC Global's top executives. "Customer spending levels in the fourth quarter were significantly lower than expected as budget exhaustion and capital discipline drove customer behavior," company president and chief executive officer Andrew R. Lane said in a statement on February 13.

The company's sales totaled \$766 million for the fourth quarter of 2019, down by 19% compared with the third quarter of 2019 and 24.1% lower than the fourth quarter of 2018.



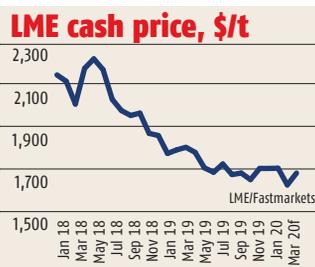
Transportation restrictions in Wuhan, Hubei province, are impacting markets following the novel coronavirus outbreak

# Market analysis

## Aluminium

### Weaker demand outlook

Fastmarkets MB research has revised down its forecast of global aluminium demand growth in 2020 to 2.0% from a previous forecast of 2.6%. We believe the long-term outlook is strong, especially from the automotive industry as it adopts higher emissions standards, electrification and fuel efficiency. But short-term downside risks for aluminium demand have increased given the disruptions in China and to global manufacturing supply chains caused by the coronavirus, which come on top of existing macro/geopolitical uncertainties. We now see a global surplus of 204,000 tonnes for 2020, from the deficit of 111,000 tonnes we previously forecast. This is not a

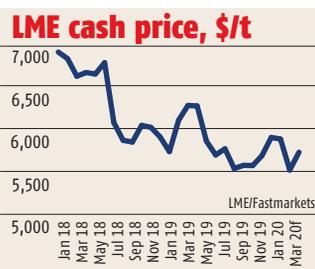


material change in a 66 million tonne-per-year market, which will be balanced this year. Beyond the short-term volatility – which may yet bring new cycle lows in the coming month – a fundamentally balanced market should allow prices to work back towards \$1,800 per tonne levels once the virus crisis has passed and pent-up demand emerges fueled by monetary policies.

## Copper

### Bullish fundamental narrative postponed

Early this year, we were looking forward to the prospect of a pick-up in Chinese demand after the Lunar New Year holidays, building on the improvement in sentiment after the de-escalation of the US-China trade dispute. Coupled with tight supply-side fundamentals, this could have paved the way for an average price in Q1 2020, somewhere near \$6,400 per tonne. However, the coronavirus outbreak has changed that narrative, and the Q1 average is now destined to fall below \$6,000. Moreover, having previously modeled a balanced global refined market across the first half of the year, we now see a 174,000-tonne surplus in Q1 alone after revising down our

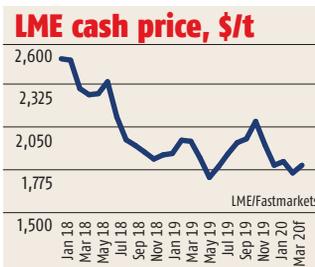


short-term demand expectations. However, pent-up demand, a supportive monetary and fiscal policy stance by authorities in China and elsewhere, together with supply disruptions, should see a more bullish landscape in the second half, assuming the virus is contained. Although prices may go lower, the coronavirus sell-off is a buying opportunity in our view.

## Lead

### Chinese supply, demand downgrades

One of the industries hardest hit by the coronavirus outbreak in China is the auto industry – the largest user of refined lead in lead-acid batteries. We expect exceptionally weak Chinese vehicle sales and production in Q1 2020, and a growing knock-on effect to overseas auto production lines that rely heavily on parts made in China. Lead demand is likely to be hard hit by the fallout and we have lowered our forecasts focusing on China and Q1. We cannot rule out further downgrades as the virus's toll on demand becomes clearer. But the slow return to work, demand uncertainty, extended winter breaks at local mines, the suspension of scrap

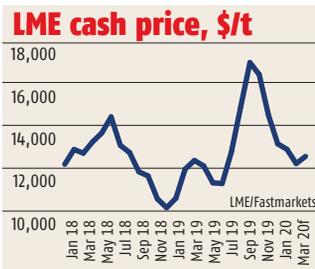


collection, the build-up of by-product acid at smelters and logistics restrictions have meant severe disruptions on the supply side. The revisions to our supply-demand forecasts have seen the global refined lead surplus we forecast for 2020 expand by about 50% to 155,000 tonnes. Lead prices are reflecting this softer fundamental backdrop.

## Nickel

### Worse before it gets better

Nickel has been burdened in the past month by the fallout from the virus outbreak, a surge in LME stocks, abysmal Chinese electric vehicle sales data and weakness in the Asian stainless steel market – in each case the opposite of the bull themes that had propelled nickel prices higher in 2018 and H1 2019. LME nickel stocks have now risen by 47% since the end of 2019 and although SHFE stocks have not increased this year, combined exchange stocks are up 37% so far in 2020, suggesting there is plenty of class 1 availability and undermining fears to the contrary. And while Chinese new energy vehicle (NEV)

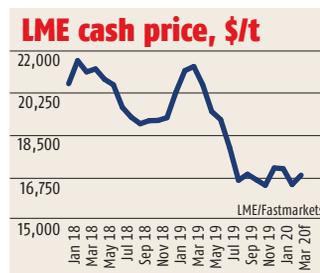


sales slumped 54% year-on-year in January, February is certain to be worse given the virus lockdowns. As for stainless steel, oversupply is exacerbated on virus-related disruptions, resulting in stock builds and pressure to reduce production, and nickel usage. Nickel prices may fall in the short term before they recover in the medium term.

## Tin

### Price rebound on hold

The tin market has not been immune to the elevated macro uncertainty surrounding the coronavirus and its implications, which has led to weak market action in the broader base metals complex. We expect more short-covering potential in tin as, fundamentally, this was a market in deficit last year and will be again this year considering supply shortages and the dovish response of major central banks, especially the Peoples Bank of China, to the coronavirus outbreak that should boost demand. Tin may be one of the base metals to recover most strongly when macro fears dissipate. However, for

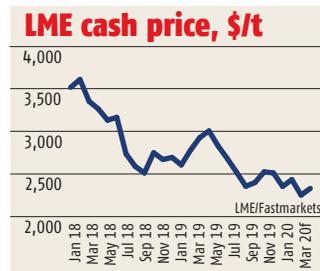


now, the global refined tin market is in temporary oversupply due to the lack of demand caused by the coronavirus outbreak, reflected in the increase in exchange stocks (+1,700 tonnes or 13% so far this year), heavily focused on China. This leaves tin, like other base metals, at risk of price falls in the short term.

## Zinc

### Weak fundamental outlook now appears weaker

Zinc prices have been eroding over the past month and by February 24 had slipped to a fresh three-and-a-half year low of \$2,055 per tonne, which puts the \$2,000 landmark in sight. Prices have been as high as \$2,448 per tonne as recently as January. The coronavirus is taking a heavy toll, but zinc sentiment was bearish before the outbreak, as the fundamentals were perceived to be moving into oversupply. The virus fallout has made a weak outlook weaker, as the impact now seems to be on the demand side, even though supply is also being affected by extended winter shutdowns at mines in northern China



and lower smelter utilization rates as stocks of by-product acid build up. We have lowered our forecasts for Chinese zinc supply and demand for Q1 2020; we have also raised our expectations for both in the second half. However, the global supply-demand outlook remains in flux and revisions to our forecasts may become necessary.

Analysis by **Andy Cole**, Fastmarkets MB

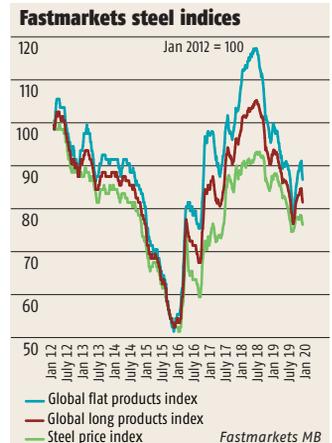
## Steel

### The outbreak of novel coronavirus unsettles steel markets

The Chinese steel market has been deeply impacted by the coronavirus epidemic. While long-term implications remain uncertain and depend on how long it will take to contain the spread of the virus, February has been characterized by a fall in end-user demand in the country, a build-up of steel inventories in the supply chain and a sharp drop in steel prices.

To contain the spread of the virus, the Lunar New Year holiday in China was extended until February 3 or February 10, depending on the region. But not all manufacturing firms and construction sites were able to resume their operations straight after. One of the problems has been that migrant workers were not able to return to their jobs because of travel restrictions and lockdowns that remained in place, exacerbated by mandatory 14-day quarantines for returned workers. According to local press reports, two thirds of workers should return to work by the end of February, and the workforce will be complete only in March if the spread of the virus is under control by then.

Traditionally, steel mills continue to operate during the Lunar New Year break, which leads to a build-up of stocks through the supply chain. As soon as end users return to the market, stocks start to fall rapidly, and stronger demand pushes prices higher. Delays in the restart of normal business activity this year has meant that stocks have continued to accumulate in February, with particularly sharp rises at



producers. By February 21, flat steel stocks held at mills rose by 59% year on year, while rebar stocks jumped by 126%. Inventories held at warehouses also rose, but at a smaller scale.

February opened with steep price falls of domestic and export prices and declines continued through most of the month. Hot-rolled coil (HRC) and rebar prices in Eastern China fell from 3,870 (\$558) yuan per tonne and 3,655 (\$527) yuan per tonne at the end of January to 3,470 (\$497) yuan per tonne and 3,385 (\$485) yuan per tonne by February 17, respectively. With a challenging situation at home, Chinese producers turned their attention to the

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# Market analysis

export market. Eager to secure orders amid mounting inventories, Chinese mills dropped their offers, pricing out rival suppliers of flat and long steel products in Southeast Asian market. In the middle of February, we also heard about a reappearance of Chinese billet in the export market, not seen in the past three years.

The impact that the epidemic will have on the steel market depends on how long disruptions to normal economic activity will last. According to a forecast from Oxford Economics, if the spread of the virus is contained in February, it will mean a 2% drop in China's GDP in the first quarter, with a rebound later in the year; on an annual basis Chinese GDP growth will be 0.6% lower (5.4% versus 6.0% previously). We believe that once quarantine measures are lifted and logistical and operational issues are resolved, steel prices in China should recover, but a downtrend in February has led to a downgrade of our forecasts on an annual basis.

Interlinked global supply chains mean that disruptions in China are affecting manufacturing companies around the world. Wuhan, the center of the outbreak, is an automotive hub, with a number of car manufacturers and suppliers of parts located there. A shortage of components from China lead to a closure of car factories in South Korea in early February, while some European carmakers warned that they could also be forced to stop production in the coming weeks, expanding downside risk for steel prices.

Analysis by **Marina Maliushkina**,  
Fastmarkets MB

## Steel raw materials

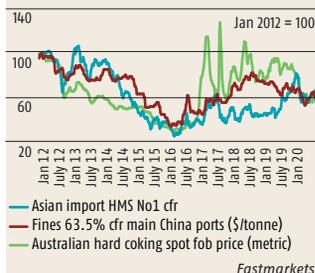
### Coronavirus outbreak and supply disruptions shape the iron ore market

Prices for iron ore declined for three consecutive weeks as the coronavirus outbreak reduced business activity and restricted logistics in China and beyond, before rebounding in the week ended February 14 amid supply disruptions in both Australia and Brazil. Fastmarkets indices for 62% Fe and 65% Fe fines averaged \$86.94 and \$102.16 per tonne cfr, respectively, after peaking at \$96.67 for lower-grade and \$110.08 for higher-grade ores in the second half of January.

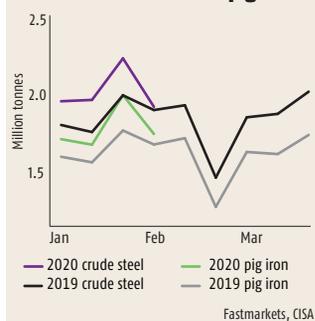
Just as China and the US started to reach a deal and the trade tensions eased, the coronavirus has again increased the uncertainty in the markets. Although there may be little or no impact on China's GDP in the long run, there are short-term implications as steelmaking raw material prices are responsive to sentiment. The extended Lunar New Year holiday period added to the bearish sentiment in early February.

The Chinese government also imposed restrictions on the movement of people and goods and extended the holiday until February 10. The Hubei region is not a major industrial hub, but Wuhan is still an important steel-producing region and a connection point where raw materials pass through the Yangtze and Hanshui rivers to supply iron ore to the Wuhan Iron and Steel Corporation (WISCO), among others. These river transport routes were placed under lockdown. At Chinese ports, there have been strict prevention and control measures to contain the virus spread, which has slowed the loading and

**Fastmarkets MB steelmaking raw materials indices**



**Extended holiday in China leads to falling daily average production rates of crude steel and pig iron**



discharging rate for goods.

The similarity of the current coronavirus outbreak to the SARS event in 2003 allows us to evaluate the possible impact on the Chinese. While there was clearly an impact from the SARS outbreak, the effect was contained to a limited period and was soon blurred into the general economic trend of the time. For example, growth in industrial production slowed due to SARS, but when the epidemic was contained, it soon returned. However, the rate of industrial production growth was just 6.2% for November 2019 and 6.9% for December 2019, which is significantly lower than the level seen prior to the SARS epidemic, so any disruptions now could have a different impact.

The dampened demand has already become apparent in the

numbers. Both crude steel production and pig iron production fell in early February, recording the biggest drop since 2015, down 12% and 10% respectively, as the chart shows.

However, just as iron ore prices declined amid the virus outbreak, they rolled back up after most recent supply disruptions in both major export markets, Brazil and Australia. Brazil has been suffering from heavy rain for several weeks, and it is now evident that volumes have been disrupted as Vale has lowered its production guidance for the first quarter by 5 million tonnes to 63-68 million tonnes. A few days later, on February 17, Rio Tinto also announced it would reduce its production guidance for the year by more than 2% as a result of cyclone Damien, which damaged the infrastructure at Pilbara Port and the connecting rail network in Western Australia.

The supply concerns are likely to add upward pressure on iron ore prices in the short term. The downward risks come from the demand side as the emphasis among steel mills in China has been to manage the impact from the 2019-nCov outbreak, which has slackened iron ore demand. There is still uncertainty about when the outbreak will be controlled to the point where industrial activity can return to normal. We are unlikely to see a real boost in iron ore demand until then.

Analysis by **Alona Yunda**,  
Fastmarkets MB

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# Learning from leaders

The cover profile interviews published by *Metal Market Magazine* provide fascinating accounts of the journeys taken by today's leaders in steel and metal businesses to reach their current roles, throughout the supply chain. In this annual review, we summarize their stories from the past year's issues to highlight some of their key experiences and insights on leadership, management and strategy

Our March 2019 issue summarized the cover profiles published over the first year of *Metal Market Magazine's* publication, providing real-life examples of good business leadership, management and strategy given by leaders with extensive practical experience of running international companies. Only the full published interviews provide details of each individual leader's route to the top and their company's strategy at the time of original publication but, one year on, once again summaries of the past year's cover profiles are collected together here to highlight an inspirational range of some of the key experiences and insights on leadership included to date.

## Building a diverse group

In just 40 years, Cronimet has grown from running a single business from a scrap yard in Karlsruhe, Germany, to an international enterprise with annual sales of \$3 billion. The group comprises two separate daughter companies – Cronimet Holding and Mining. CEO of Cronimet Holding and co-shareholder of Cronimet Mining Jürgen Pilarsky explained how the family-owned company had done it.

The offices at Cronimet's headquarters in Karlsruhe, Germany offer a good view of the substantially expanded original scrap yard where the business started 40 years ago. Nowadays, from this hub of an international business that operates at



Jürgen Pilarsky: "Step by step, the business steadily increased – mainly through partnerships"

over 70 locations worldwide, Cronimet's directors look beyond the horizon to monitor progress at the holding company's subsidiaries in Western Europe and further still – across the Atlantic – to activities in the United States. To the east, the company has a significant, but separate, mining enterprise with a copper-molybdenum asset in Armenia and, to the Far East, a presence in Asia. In the southern hemisphere, the company has scrapyards in South Africa and further recycling operations in Brazil.

A timeline of the main highlights of Cronimet's expansion since its foundation in 1980 as Cronimet Ferroleg. (Ferroalloys) by Jürgen's father, Günter Pilarsky, is peppered with multiple milestones. Cronimet is a 100% family-owned business comprising the two daughter companies. Cronimet Holding is primarily a stainless and special steel scrap processing and trading company, which

were the activities in which the enterprise started its business and are activities that remain at its core. Cronimet's substantial separate company, Cronimet Mining AG, formed as Cronimet Mining GmbH in 2004. "These are two separate companies and only the shareholder structure is rather similar," Jürgen Pilarsky explained (*MMM April 2019*).

Initial expansion began in Germany with the opening of a subsidiary in Düsseldorf, followed by further businesses in Germany. "Then, step by step, the business steadily increased – mainly through partnerships I would like to say," Pilarsky said. The net widened across Europe. Progressively, joint ventures formed and many of those subsequently became Cronimet subsidiaries. "It has been 40 years that we have been growing, but it was nevertheless sometimes rather fast," Pilarsky recalled.

The foundation of Cronimet Mining came in 2004. "I always say that it was an opportunity that has unexpectedly arisen and that we have seized. It happened because the Armenian state decided to privatize the mine," Pilarsky said. "It was a huge step to enter into a mining business," he added.

Cronimet participated in a tender process, which it won and entered into the mining business. "Today, we are also managing the mine by ourselves. This was a huge development, to develop this knowledge to be able then to manage a

whole mine. It is a totally different business to manage a mine than to run a scrap processing business," Pilarsky stressed.

Cronimet Holding has four business units: recycling, production, trade & sales and services. In addition to processing stainless scrap, to which some of the company's locations are exclusively dedicated, at Karlsruhe Cronimet processes titanium and titanium alloys, high-speed steel and tool steel alloys, tungsten carbide, nickel-cobalt and cupronickel. "So in the end we are specialized in alloys," Pilarsky summarized.

### Managing it all

Pilarsky explained that Cronimet's approach to growth has been to establish good relationships, encourage an entrepreneurial spirit in Cronimet staff, and then to spot and to seize opportunities wherever they arise. Evidence of that spirit is found in item number 1 on Cronimet's list of corporate values: "We think and act entrepreneurially."

So how does Pilarsky and the members of his senior management team direct such a large and diverse international business? "We are centralized as we have to be. We have a holding company and the holding company is here in Karlsruhe, where we have financing, HR, and our central business departments. This is to offer these kinds of services to all of our subsidiaries. The holding structure is a service provider for our subsidiaries," he explained.

"So, the business itself has to be done in all of these subsidiaries. We are not telling them what they have to do tomorrow. They have to be entrepreneurs themselves," he summarized.

Cronimet is embracing digitalization as an aid to managing its widespread range of operations. "We are making our processes transparent to everybody in Cronimet. For me, this is the most important step that we have to do. We chose SAP about five years ago and we are rolling it out ourselves... This at the end should give us this 100% transparency for everybody," Pilarsky said.

"The next step will then be to collect all the big data and information, and to create a proper process out of it," he explained. "Further we want to connect it with our customers and our suppliers." One of Cronimet's major European stainless steel mill customers is

introducing SAP for example. "This is the future – other industries are doing it already and it is not rocket science," Pilarsky said.

### Solutions for sludges

A relatively recent addition to the Cronimet stable is its Envirotec business, which has a processing plant in Bitterfeld-Wolfen, about 50 km from Leipzig. Cronimet's Envirotec subsidiary adds a solution for recycling industrial sludges and metal powders.

A chemist and business leader, Cronimet Envirotec's CEO Filipe Costa holds a PhD in chemistry, for which he wrote his thesis about the use of carbon dioxide as a chemical building block in work that he did in Germany. At the same time, he started to do a three-year modular MBA in Stellenbosch, South Africa. It focused on leadership and ways to think differently on a strategic basis. He said (*MMM April 2019*) that it demanded a considerable amount of self-analysis and that "It changes the way that you think and makes you more aware of the people around you that you work with."

He said that a period of operating in "two different worlds" when completing his PhD and working in Germany – in between flying to South Africa for MBA modules – was hard work but also a very stimulating time that broadened his horizons. On completing his PhD, he joined a large chemical company and started work in a laboratory in "a typical corporate job." The MBA changed his outlook, with its business content and emphasis on entrepreneurial thinking.

After a successful period working with a group of entrepreneurs who founded a company for the pyrolysis of end-of-life vehicle tires, Costa decided to expand his personal development by accepting an offer to join Cronimet. He said that the company has a very collaborative approach to management and that the entrepreneurial approach encouraged by the Cronimet group is also nurtured within Envirotec: "That way the sense of responsibility and accountability grows," he explained.

To attract and build an innovative management team to run Cronimet Envirotec, the subsidiary company was initially treated as an "incubator" business with an office in a co-working space on the sixth floor of a skyscraper beside the main university buildings in central Leipzig. The trendy 'start-up



Filipe Costa:  
"We had the freedom to reshape the company and implement the strategy that we developed"

vibe' that the whole working environment offers there paid dividends for Cronimet Envirotec, although Costa stressed that the subsidiary company is well beyond that stage of its development now.

### Recycling technology

Cronimet first took interest in an independent business called Destimet Green Services in 2013. Costa said that at the turn of that year into the beginning of 2014, Cronimet already knew about the vacuum distillation technology that the company was developing, but knew little about Destimet as a business. After learning more, Cronimet took a minority share in the company, based on its interest in the technology and its applicability to the metals market. During 2013-15, Cronimet developed its understanding of the business model further and, by the beginning of 2015, decided to acquire a majority share of the company.

Costa joined the business in January 2015. His clear mandate was to develop a strategy focused on the metal market and to integrate the company with, and to broaden the capabilities of, Cronimet itself. "We decided to buy out the company 100% in August 2015," Costa recalled. "We then had the freedom to reshape the company and implement the strategy that we developed," he explained. The subsidiary was rebranded to become Cronimet Envirotec in 2016.

Since then, Costa has grown his management team and has fully implemented the benefits of using mobile digital technology. "I have everything I need in here," he said, pointing to his tablet. The company uses Google G Suite. "We report everything into the cloud, taking advantage of all of the security features they have built in," said Costa. "That is how we manage our data. We have a policy that we want to have everything readily available on our mobile devices. We work together on documents for example. It makes our life easier," he explained. ▶

Over the couple of years to early 2019 the company focus was to grow within the metals market, to get to know customers even more, and the technologies they use that produced the waste materials that Envirotec processes. “And at the same time to grow this team and to have the technological proof of concept, to run the plant continuously 24/5, and to implement all of the learning that we had from the previous years of operating the production system,” Costa summarized. Envirotec has also invested in expanding its specialized storage facility for incoming metal sludges and powders while continuing to expand its material processing capabilities.

Given the large and growing range of materials that Envirotec can process, the number of potential customers is large. Costa said that while Envirotec has to be competitive on pricing, “and our growth shows that we are,” the company also focuses on recycling and keeping metals within that loop. “We want to stop the loss of resources,” he added.

Costa concluded that being part of a large family-owned business with a top-level management that has embraced innovation at Envirotec, and across the whole group, is a big advantage.

## Advancing innovative technology

President of Fives’ Steel & Glass division, Guillaume Mehlman has a 30-year history of working in a series of major engineering and materials businesses. Armed with a Master’s degree from École Polytechnique, obtained in the mid-1980s, he completed a PhD in Fluid Mechanics from the same establishment while working as an R&D engineer for EADS Defence & Security

A move to Cogema Nuclear Fuel Processing followed, where he successively headed engineering and then became a project manager. In the early 2000s, further senior roles followed, including the post of managing director of Alstom Transport’s Le Creusot plant in France, and a similar position in industrial operation at the head of Areva’s special metals business. A switch to the US at the beginning of 2011, as Alstom Transport’s senior vice president North America, based in New York, saw a four-year period overseeing a \$350 million business supplying rolling stock, services, signaling and railway infrastructure.

He returned to France as managing

Guillaume Mehlman:

“We see the business is good because it is much more balanced than it was before”



director of GE Power Services in South West Europe, before joining Fives in November 2016. “It’s really been about learning new things and challenging myself from one position to the next,” said Mehlman (*MMM May 2019 issue*). “It is what I would call a horizontal career path going from a more fundamental technical background to more operational management type responsibilities,” he explained.

“It’s been very exciting and over the past ten years has involved more exposure to sales and business development,” including those few years back to his original culture while based in the US, where he grew up.

Mehlman sees the variety of industries that he has worked in as an advantage. “I think that helps me to understand the business issues, the technological, the operational, the project and contracting issues from that exposure to energy and rail,” he said.

## Main aims

He explained that the main aim of the Steel division of Fives is to be able to maintain a competitive edge against the big players in the industry. “We’re not as integrated upstream as the big players are and so we have to focus on bringing value through technology and services for customers, where our big competitors can play and leverage on other aspects; and they serve clearly the upstream part of the industry whereas we are more on the downstream products. So that is a constant focus and objective of mine to really think where are we going to take the technology and keep being in a position to bring something different or better,” he stressed. That focus includes services as well as innovative technology.

As a group, Fives serves a wide variety of different industries, including aerospace, aluminium, automotive, cement and minerals, energy, glass (for which Mehlman also has responsibility), logistics as well as steel. Mehlman summarized that there are two aspects to leveraging advantage from serving

multiple industries: “One is resources – because basically our DNA is project management in B2B mode for industry – and the other is in crossing-over technologies.”

The geographical balance of demand for plantmakers has shifted from the boom of past years in China back towards investment by steel producers in Western markets. “That is one shift that we have made within the past two years – addressing the US market, and now the European market where we see investment. And that means changing ways of doing business,” he noted. “The other aspect is that we’ve managed to bring some really innovative technology to the market in the last two years. I would say, for example, our transverse flux induction heating technology, where we have brought into the market some very new and important breakthroughs. And in our cooling technologies for strip processing lines we’ve made very important market introductions,” he added.

China remains a very important market for Fives, but Mehlman noted that plantmakers need to adapt to differences in the priorities and approaches to business of customers in different international regions. “Execution is full of difficulties and there is a different way of addressing them in China than in Europe or the US,” Mehlman noted. “So it means that you have to adapt to that in your way of managing a project. The contract and your contractual requirements are different than in Europe or the US,” he said.

“We see the business is good because it is much more balanced than it was before, with different regional markets to serve, and it’s better for us to manage loads, resources and expertise to serve it. It is a much more interesting time and a better time than when it was much more focused on China a few years ago,” he said.

## Multiple mine experience

When deciding which discipline to specialize in when he was at the Engineering School at the University of Chile, Diego Hernandez settled on mining engineering, “an area where you need to know a little of everything because mines are isolated – so you need to understand electricity, mechanics, geology, manage different resources like people, financial, technical. I think that



**Diego Hernandez:** "I take a job, and I enjoy it while I am learning. But there is a moment when the contribution starts to be flat and then it's time to move."

was what attracted me," he recalled (*MMM June 2019 issue*). His path to the role of president of Sonami (the Chilean mining society Sociedad Nacional de Minería) subsequently encompassed multiple leading roles in some of the best known mining houses and at some of the world's largest mines.

After a spell in tin-tantalum mining, he became assistant general manager at the Mantos Blancos copper mine in Chile's Antofagasta region. "It is at Mantos Blancos that I learned a lot about operations because the mine was underground and open pit with an oxide plant and a concentrator – it was like two mines in one," Hernandez said.

The opportunity to move to Brazil and develop a project presented itself. Hernandez left Anglo American and joined Rio Tinto at the Morro do Ouro gold operation in Paracatu, Minas Gerais state, just as its feasibility study was approved. "I was number two for the project – firstly working as the counterpart for the engineering firm doing the project and then the rest of the time organizing and preparing the company for production. That's where I learned how to manage projects," Hernandez recalled.

### Managing big projects

Work completed at that project, he was appointed in charge of the development of new projects at Rio Tinto Brazil, but then received an offer to return to Chile with Anglo to take over a gold project it was just starting. It was a "very tough experience, because we built, commissioned and shut the project down within three years." The exchange rate and gold prices turned against the project, "plus the gold recovery was not what had been expected from the feasibility study. It was very tough, probably the hardest job I ever had – very good training, but very expensive training," he added. He noted that Anglo American was incredibly supportive throughout the experience.

Hernandez continued to work with Anglo American in Chile as development

manager. The miner had two new copper projects – Manto Verde in the Atacama region and an ambitious plan to develop one pit on top of all the underground mines and open pits of the existing Mantos Blancos operation. He revisited the earlier idea of an enlarged mega-pit at the mine. "When I came back to Mantos Blancos I thought it was too late for the project, but the country manager asked me, 'why don't you look into it again?'" Hernandez said. "So we did, and that's why Mantos Blancos is still alive today. Both projects were very interesting and successful," he said.

Hernandez became the general manager of Mantos Blancos Company. The management of Compañía Minera Doña Inés de Collahuasi – a joint venture in which Anglo American was a major shareholder – was separate but when the Collahuasi CEO left unexpectedly, Hernandez was offered the role on a temporary basis while the search for a full-time executive took place. He became the mine's joint venture partners' choice for the role on a permanent basis. He joined Collahuasi in 1996, as the project secured its financing package and began construction, spending nearly five years at the project including through the mine's first year of commercial production. All his previous knowledge came together, creating the biggest project worldwide in copper at the time.

Hernandez' next move was a return to Brazil to work with recently privatized mining firm Vale. It was 2001, and he was in charge of non-ferrous metals, which included Vale's first copper project, Sossego in Carajás. After a successful period there, Hernandez was offered the role of head base metals for BHP Billiton. "I thought that was a unique opportunity because it was an international job, but based in Santiago," he said.

He spent six years with the mining giant, running a global portfolio that included the Cannington silver-lead mine in Australia, the Antamina copper-zinc joint venture in Peru, plus the Escondida and Cerro Colorado copper operations in Chile. During his tenure, BHP Billiton also built the Spence copper mine in the Atacama region of Chile. It was during his time at BHP Billiton that Hernandez was nominated for a Copper Club Ankh Award. But by the time of the award ceremony in June 2010, he had left BHP Billiton, having been offered the position of CEO of Chile's state-owned copper producer, Codelco. A strong sense of national calling swung the tough choice for him.

"It was a challenging time, but I think we did a lot of good things. Among others, we exercised the option to buy back Los Bronces from Anglo American Sur – Codelco eventually succeeded with that," he said. "It was most unexpected for many people who didn't believe Codelco could make that kind of move," he added.

He subsequently became CEO of UK-listed miner Antofagasta Minerals, a role he stayed in until 2017, when he decided to leave executive management positions, becoming president of Sonami. "Working for a business association is a little like a public service because you have to work for the country, the industry," Hernandez reflected. "My approach has been I take a job, and I enjoy it while I am learning. But there is a moment when the contribution starts to be flat and then it's time to move. If you don't have another opportunity in your organization then you don't need to be ashamed to look somewhere else," he noted.

### Overcoming many challenges

Ukrainian steel producer Metinvest has faced seizing of its assets by rebels, military actions right next to its plants, interruptions in raw material supply and debt restructuring over last five years. Over that period, the company was headed by CEO Yuriy Ryzhenkov. He continued to develop Metinvest throughout that challenging period.

Ryzhenkov is originally from Donetsk. "My grandmother worked at a coke plant. My grandfather was a coal miner. My mother and aunt were rolling mill engineers, and my father and uncle were steelworkers," Ryzhenkov recalled (*MMM July-August 2019 issue*). Oleksandr Ryzhenkov, Yuriy's father, headed Donetsk Iron & Steel Works (DMZ) during 1994-2012.

Yuriy Ryzhenkov was appointed as Metinvest's CEO in December 2013, just before the most challenging time for the company began. "In 2014 a lot of things



**Yuriy Ryzhenkov:** "I would like Metinvest to be the company of which all the country is proud"

happened at one time,” Ryzhenkov recalled. “There was a crisis in the steel industry connected with commodities markets, when raw material and steel prices dropped. Then there was a political crisis in Ukraine, and what is more the war had started. [On appointment as Metinvest’s CEO] I could not even imagine that the situation would turn this way in December 2013. I had a completely different view of what I would be focused on,” Ryzhenkov said.

Violent street protests broke out in Kiev in November 2013 against the decision by president Viktor Yanukovich to spurn a trade and cooperation deal with the EU and seek closer ties with Russia instead. Following months of demonstrations, Yanukovich was toppled in February 2014 and, shortly after that, Russian forces took control of the Crimean peninsula. Subsequently, Russia-leaning separatists in the east Ukrainian cities of Donetsk and Luhansk took over government buildings there.

By August, damaged infrastructure and destruction at steel and coke-making facilities, as well as power outages, led to serious operational disruptions and sharp drops in output. At that time, all of Metinvest’s Ukrainian steel mills (except for the partly owned Zaporizhstal), as well as the company’s head office, were in the Donetsk region.

In May 2014, both Donetsk and Luhansk regions declared themselves independent according to the results of the hurriedly arranged referendums. Metinvest lost control over its long steel mills Yenakiiiev Iron & Steel Works (Yenakiiiev Steel), the Makiivka wire rod unit, pipe-making mill Khartsyzsk Pipe and a number of coal assets in March 2016.

During these years Metinvest’s Avdiivka and Mariupol assets located right next to the demarcation line suffered the most and were considered to be the most insecure, Ryzhenkov said. Nevertheless, at these mills Metinvest faced the lowest level of employee turnover because people were staying there and were defending their enterprises, he added.

## Successful debt restructuring

The company’s successful debt restructuring is one of the key changes under Ryzhenkov’s management. In April 2018, Metinvest successfully completed refinancing of its US\$2,271 million debt, which was the largest ever among Ukrainian corporations. “We completed

the restructuring of the debt in March 2017, while refinancing was done in April the next year. All our consultants were saying that it is unreal, that at least two years were needed. We succeeded to do it in one year.”

The company has also managed to continue ecology-related projects, which were especially important in Mariupol. “Now it can be underestimated and taken as granted, but it should not: in 2015-2016, when within 25-kilometers’ distance there were heavy guns, it was rather hard to continue ecological projects, which has no business effectiveness, just social effectiveness. Despite this, we continued our investments in ecological improvements. For me it is a sign that we have looked far into the future,” Ryzhenkov said.

Metinvest plans to invest further in its production facilities. “That will be related to our products’ quality improvement and the environmental compliance of our mills. We are also planning to move to downstream products output and to focus on key outlets where we can provide our customers with services that our competitors cannot supply,” he said.

“I would like Metinvest to be the company of which all the country is proud. I want Ukrainians to be proud that they have such a national company, which represents the country on the global arena,” he said. “What is Metinvest for me? It is my life. It is not just work. If your job is just work you should change this job. It should be passion, care and motivation. Thus, for me Metinvest is all together – motivation, care and development of the regions [where mills are located],” Ryzhenkov concluded.

## Transforming aluminium smelting

Vincent Christ has been the CEO of ELYSIS™ – a technology joint venture led by Rio Tinto and Alcoa that is setting out to revolutionize the aluminium smelting industry – since its creation in May 2018. He was formerly working in Rio Tinto’s aluminium unit, responsible for the division’s research and development department as well as key investment projects, and held many international posts along the path leading to that role.

With a Bachelor of Science degree under his belt, his first job was for Swiss aluminium producer Alusuisse. Married to his childhood sweetheart Martine, he worked for a couple of years to pay off his student debt before the pair decided to



Vincent Christ:  
“I believe people will thrive as long as they grow in their roles”

explore the world. “I ended up transferring to a small company owned by Alusuisse that was doing international business in equipment sales and services, and we moved to Venezuela,” he recalled (*MMM September 2019*). It was 1987, and Vincent described the experience as one of his career highs. “It was paradise! Just imagine, being 27 years old, recently married, living in the tropics with a house and a car, palm trees around us – and a fascinating role in automation,” he added.

During the seven years that he and his growing family lived in Venezuela, his role advanced to country representative, but the family left Venezuela at the end of 1994 because life there was becoming increasingly challenging as political turbulence in the country grew.

The family returned to Zurich, Switzerland, where Vincent became director, smelter technology for Alesa Alusuisse Engineering (AAE), heading global technology sales and transfer in the field of aluminium smelting. Vincent believes that his hands-on, entrepreneurial role over fifteen years at AAE served him well for his future move to his present role.

The parent company Alusuisse was acquired by Canadian aluminium producer Alcan in 2000. In 2002, a senior Alcan executive suggested Vincent move to the combined group’s head office in Montreal. In 2003, he relocated and joined the Alcan Primary Metal group as director of engineering and maintenance, taking charge of some large smelter expansions. That same year, Alcan acquired French aluminium company Pechiney, which added its engineering personnel to his direct reports.

In 2006, he joined the Alcan bauxite and alumina division as vice president, technology. A major acquisition was ahead: Rio Tinto purchased Alcan in 2007, and moved the bauxite and alumina headquarters to Brisbane, Australia. But within a year of the move, the 2008 global financial crisis hit. The slump in aluminium demand and prices that followed saw producers slash output,

curtail operations and projects, plus cut costs, which meant Vincent's role in the merged bauxite and alumina department as general manager, technology, "vanished."

The family returned to Montreal and he became Rio Tinto aluminium's vice president for value improvement. From mid-2011, he headed Rio Tinto aluminium's global technology and equipment sales & services business – the 2,500-strong international unit that included his former employer, AAE. For strategic reasons, Rio Tinto eventually decided the division's businesses were non-core, and he was put in charge of the divestment process. It went well, he says. "The three companies I divested are today in good shape, and are core businesses where they landed. It was a good outcome," he added.

"My international experience is an important element in helping me get to ELYSIS. We don't, for example, drive for consensus or rule that the boss decides – we try for the best decision, no matter how we get there," he said. "We're very inclusive and at the same time, if we take a decision on Monday and realise on Tuesday that it wasn't any good, then we change it," he added.

"In an entrepreneurial environment there are no barriers to personal growth other than a willingness to do it. I assembled the team so that everyone could find their sweet spot, and I believe people will thrive as long as they grow in their roles," he said.

"This the best job I've ever had in my career, and with the best team I've ever had the privilege to lead. It is unbelievable, frankly, unbelievable. I really am selling a dream!"

ELYSIS is scheduled to have a technology package for sale beginning in 2024. Vincent said that uniting different cultures of companies, countries and individuals in an environment that can thrive is something that he pays particular attention to. "Teamwork is a fundamental value – if we don't live that value every day, we're not going to succeed. I think we're doing extremely well on this. Today if someone from outside looked at ELYSIS, they wouldn't be able to tell which company anyone came from. It's a really integrated team," he added.

The primary focus of the new technology venture will be to develop and license its technology so that it can be used to retrofit existing smelters or build new ones. While Vincent said that shareholders Rio Tinto and Alcoa will

take full advantage of that opportunity, the company also plans to offer commercial packages for international licensing by 2024.

## Transforming the LME

Matthew Chamberlain joined the LME in 2012, having previously advised HKEX on the acquisition of the LME while working for UBS in mergers & acquisitions, providing financial technology coverage

His first job after leaving university – he was awarded an MA in computer science from the University of Cambridge, where he was at Trinity College – was at Citibank during 2004-06, from where he was head-hunted for Perella Weinberg.

"Perella Weinberg were starting from scratch. They needed some raw talent to come and join them," Chamberlain recalled (*MMM October 2019*). At Citibank, Chamberlain had also done financial institutions coverage, such as bank M&A.

Chamberlain was in the financial Institutions coverage team at Perella Weinberg Partners, a global financial services firm founded in 2006 by Joseph R. Perella and Peter Weinberg. He joined it in the year of its foundation. "It has some of the real titans of the M&A industry... There was just a certain excitement to what they were doing, which is why I left Citibank at a very junior stage and went to work for them."

"Sometimes I just think that you need to accelerate your career by trying something new. I really enjoyed my years there – because it was a very small team when I started, particularly in London... – and the opportunities it offered, simply because I was the only one in financials historically and they gave me a lot of headroom and a lot of opportunity, and I am very grateful for that. Sometimes you have got to find people who will take a chance on you and that was a great time of my life. It is still a great business doing really well."

At the LME, Chamberlain served in



Matthew Chamberlain: "Sometimes I just think that you need to accelerate your career by trying something new"

the roles of head of business development, COO and head of strategy before his appointment as CEO. "During his time at the LME, Matthew has led the LME's warehousing reform process, the deployment of the new London platinum and palladium prices and the LMEprecious initiative," stated the exchange's website list of board member short biographies.

If Chamberlain were to update that biography there now, what would he add? "Among the things I'm most proud of it's warehousing – but warehousing with a constant eye to keeping it updated – and the Strategic Pathway. I'd probably add to that now, hopefully, responsible sourcing."

Chamberlain is an experienced and effective communicator, but where does a talent for clear communication come from? "I think that I've just been lucky that a lot of people – I'm thinking of when I was a kid – my parents, my teachers, challenged me to have thoughts and communicate," he replied. "Having kids of my own now, I think one of the biggest things that you can give them is just a willingness to voice their opinions and to challenge them (obviously in a nice way when you're conversing with a four-year old!) to formulate their views and put them across and to be supportive of them and to be proud of them. I'm really lucky that in my childhood people took time to do that with me."

The LME wants to upgrade its trading platform because, although LMEselect does the job now, the exchange has become more ambitious as it looks at new products, more electronic and things like implied pricing. "We're running up against the limits of what our current platform can deliver... We looked at new solutions – a key element of what we looked at was whether we could leverage the Hong Kong solution into a metals trading platform," he said. "We decided that is the route we want to take, so there is now a very ambitious joint project between London and Hong Kong."

The LME plans that it will go live in late-2021. "It's a big lift, but what it's allowed us to do is to take our view of market structure and the most difficult part of the Strategic Pathway, put them into this project and really build a trading platform from the ground up."

## Serving metal recycling

While still in high school, Tom Wendt accompanied his father Thomas Wendt Sr. to a conference held by the Institute ▶

Tom Wendt, Jr.:  
“I believe that our industry is always searching for a competitive edge, and our business is built around providing that for our customers”



WENDT CORPORATION

for Scrap Recycling Industries where he was fascinated by the diversity of the audience. They ranged from owner operators to large publicly traded companies and everything in between, all dedicated to operating their businesses profitably and making a positive impact on the environment. Wanting to contribute to the growth of the family business, he decided to work in the recycling industry to provide equipment that would help to make better use of the world’s resources.

Today, Tom leads Wendt Corporation, Buffalo, N.Y., one of the world’s largest technology-driven manufacturers of a wide range of recycling equipment for ferrous and non-ferrous scrap management. The firm has customers throughout the Americas and Europe, and is working with potential clients in Asia, including India, the newest developing markets for recycling.

Upon graduation from Canisius College, Tom spent 10 years in sales for Wendt before being named president, at age 35, in 2011. The company’s portfolio of products and services has grown steadily over the past 42 years as the firm has evolved from an organization servicing recycling machinery to an agent for the products made by others to eventually become a full-scale design and manufacturing firm.

Today, Wendt Corporation offers a full range of products for the ferrous and non-ferrous recycling industry from the shredder infeed conveyor through the recovery and finishing of non-ferrous metals.

While the leadership of the family-owned and operated business has changed – Thomas Wendt Sr. serves as chairman in a largely advisory role – there are many things about Wendt Corporation that have transcended the generations. “One leg we stand on is continuous development of our products. But we also have become technical partners to our customers through systems and process innovation. We leverage the technology of our partners to provide a comprehensive

solution that is state of the art, fully integrated and proven to perform. That is different from the past, where a technology company would introduce a new product, and scrap companies would have to figure out how to use it,” said Tom (*MMM November-December 2019*).

During the evolution of the Wendt brand, one mainstay has been embracing the latest technology. Wendt takes a two-pronged approach – developing its own innovations in a captive technology center and partnering with providers of world-class technology. In 2013, Wendt opened a technology center “to further differentiate ourselves in the market by developing products in house,” said Tom. “Together with our partners, we are investing significant resources into technology and processes to recycle more of the world’s scrap and waste streams. I find it very satisfying to know that we play an important role in helping to recycle the world’s scrap and waste.”

To support future growth, last year Wendt announced several strategic initiatives to support accelerated growth. One involved establishing a regional sales force. Another has expanded the service department into two groups – parts and technical support along with field service, which has doubled its staff, and a technical support group. This structure supports the growing Wendt installations while also expanding its service related product offerings.

“I believe that our industry is always searching for a competitive edge, and our business is built around providing that for our customers. If recent history is any indication of the future, when markets are soft, we’ve remained busy and simply grown our market share. Long term, I feel great about where we are and that we will continue to grow,” Tom concluded.

## Transforming company strategy

Alexander Shevelev, CEO of Russian steelmaker Severstal, has held multiple roles on his path to the role, each of which have added valuable experience for him to lead a business that employs 50,000 people as well as to execute the company’s over-arching vision to become “the leader of steel industry of the future”.

He was born [in 1974] near Cherepovets. “I finished state education and studied to become a mechanical engineer. My second education was about economics and management, and the third was a general MBA,” he recalled (*MMM January 2020*).

Shevelev started work on the shop floor 22 years ago, in 1997, in a Cherepovets steel rolling mill that is a subsidiary of Severstal’s steel plant there. He recalls the steps from working on the shop floor to the boardroom well. “I built my career in this plant. After I was a worker, I became a supervisor, the head of the shop floor; then head of the strategic department, the technical director and then the executive director of the Cherepovets site. Then I became CEO of Severstal’s metalware businesses, which produce finished products from steel, such as ropes, mesh and fasteners.” That post gave him the opportunity to feel [what it is like to be] a customer of the steel industry, “because we bought product from the metallurgical plant at Cherepovets – but not only from Cherepovets but also from the market.” That gave him the opportunity from the customer side to interact with his colleagues from the metallurgical plant.

From the role of CEO of Severstal’s metalware businesses, he received an offer from the local government to become first deputy mayor of Cherepovets city. “It was very exciting for me and it was an absolutely different way and track for me but, because I had already experienced more than 15 years in the steel business, it was really interesting for me,” he recalled.

He was in the post for a year or so. “I had to be focused on solving these problems because, in business, I have to demonstrate results. I was quite effective there because I received an offer from the regional government, which was a high position to be deputy governor.” He accepted that offer too and moved from Cherepovets to Vologda, which is the region’s centre. But after working for only three months in that position, he received another offer from Alexey Mordashov, Severstal’s majority shareholder and chairman, to go back to the company.

Shevelev returned as CEO of the group’s hardware business for six months before becoming CEO of AO Severstal Management in December 2016. He highly values systems and opportunities to communicate with the company’s staff,



SEVERSTAL

Alexander Shevelev:  
“We have changed our culture quite quickly and substantially”

managers and customers. He prizes working with many different people, with multiple emotions. “Each of us has emotions – there are your own emotions and the emotions of other people, and if you are a manager working with a number of people you should understand these emotions and take them into account and use it in a positive way for a result, and not to destroy something but to create something,” he said. “It is a way that I constantly investigate and try to use and improve,” he added. He uses the full gamut of modern digital ways to foster and achieve effective and open communication and receive feedback from Severstal’s thousands of employees.

Severstal’s recent priorities have included cost leadership, creation of great customer experience and investments in new opportunities. “We have changed our culture quite quickly and substantially. We launched a number of agile teams that are working with customers. We work with cross-functional teams with short periods focusing on results, and we have a lot of programmes receiving new skills etc.” These changes have already achieved good results, he summarized.

In what direction is he leading the company now? “I have a great opportunity to move my company from its current position in the local market to be a real leader in the future steel industry,” he said.

“I am going to transform our company from a production site to a real customer-centric company that will use not only technology for metallurgy, but implement it and use a modern business model that is digital.” He noted that there are many digital business models at other successful companies to emulate. “We will not only provide products and service, but will be a solutions provider. It is a challenge for me and for my team and I think if I manage it, I will be really happy. It is my target for the near future.”

## Deep knowledge of finance

New LME chair Gay Huey Evans has a great depth of experience in financial services. Graduating from Bucknell University in Lewisburg, Pennsylvania, with a BA in economics, Huey Evans moved, age 22, to New York and started work at PaineWebber. She was one of two women on the trading floor; her female colleague did corporate sales. It was the beginning of the fixed income market, when financial futures contracts were just being introduced. “People really didn’t know how to trade interest rate futures

against cash at that time. It was fascinating. Then PaineWebber wanted to set up a money markets department; that’s how I started,” she recalled (*MMM February 2020*).

Back then, the financial markets were “a wild world,” she said, but “you didn’t think about it because you just loved it. It was a job that was interesting, not a career. New York in the 1970s was a fun place to be, particularly if you were young. You played and worked hard,” she added.

From PaineWebber she moved to Bankers Trust, where she worked in the capital markets division. “That was the new world – derivatives. Nobody knew what a swap or an option was. It was an exciting but challenging place.” Covering mostly US financial institutions on the US east coast as well as foreign, in particular Japanese, institutions, Huey Evans says she “still didn’t think of it as a career. It was a job. At that time, I did not think I was going to work in banking my entire life.”

While she was trading FX and currency derivatives at Bankers Trust, the bank developed commodity derivatives. “We set up Enron’s venture into commodities, initially as a joint venture and then Enron took the whole project,” she added. She continued in New York until 1990, before taking an opportunity to move to London.

It was in London that Huey Evans recognized how much she enjoyed working. “It took a long time to get there, and when I did, I wanted to do the right job but definitely to also keep working. Then I realized I probably had a career,” she added.

Huey Evans had been on the board of the International Swaps and Derivatives Association (ISDA), a trade association for derivatives dealers and other market participants, since 1990. She was asked to co-chair it, but ended up becoming its chair in 1994.

ISDA addressed, and continues to address, problems – either through codes of conduct, improved documentation, reducing or eliminating legal risks, developing protection against counterparty bankruptcy, maintaining good industry relationships with regulators, and responding to regulatory and legislative concerns, including testifying in Washington, she added.

It was what Huey Evans described as a “growing-up period” in her life. “I learned much about different stakeholders and people’s interests, including politicians and lawyers,” she reflected.

In 1998, Huey Evans was approached



Gay Huey Evans: “I don’t go anywhere that I don’t like and respect the people. I have learned that over the years”

by Howard Davies, then chairman of the newly established FSA, to join him at the regulator. She was tasked with setting up the FSA markets division, where she stayed until 2005.

Its work involved regulation of markets, including exchanges, and provided her with an ongoing involvement with the LME. “The first thing I learned about the LME was the Hamanaka crisis, which had happened in 1996 but was still being cleaned up,” Huey Evans said. “Getting to know how people can get stuck in positions and don’t want to recognize losses is an age-old problem that happens over and over again in all markets. Why there were no risk systems around it to monitor it, I have no idea. It just tells you that even then, commodities were in a different world,” she added.

“The FSA role was broad, which I enjoyed. I learned so much about regulation, government and myself,” she said.

After leaving the FSA in 2005, Huey Evans moved to Citi for three years, where she had roles including head of governance, Citi Alternative Investments EMEA. In 2008, she became Barclays Capital vice chair of investment banking and investment management, and was responsible for Barclays’ relationships with sovereign funds globally.

The approach for the LME role came through a headhunter. Huey Evans had turned down several opportunities before the LME job emerged because the roles did not entice her. But attracted by the tangible nature of commodities, Huey Evans said the real draw for her in taking the LME chair role was the people she would be working with. “There’s a great team at the LME – I don’t go anywhere that I don’t like and respect the people. I have learned that over the years,” she noted.

“The LME is a unique market and it will be a challenge to understand all the nuances – clearly it will keep the brain going and make me think about what the future of our exchange is,” she said.

# Global trends in tube & pipe

International, regional and local factors are impacting global tube & pipe markets – some positively and others negatively. In a global overview, Fastmarkets MB research's Kim Leppold identifies the key trends

The extended Chinese New Year holiday in reaction to the Wuhan coronavirus outbreak resulted in a steep decline in steel prices in China in the first quarter, but pipe prices were not as strongly affected at time of writing, with just modest declines, if any, recorded. However, few transactions were made after the Chinese New Year, so it is likely that further discounting will take place in the pipe markets from Chinese producers as they look to maintain cash flow.

Nevertheless, it is the view of Fastmarkets MB research that the hit to the Chinese economy from the coronavirus will be short in duration, but also that there will be ripple effects across the global energy markets due to the drop in oil and gas consumption causing

supply overhangs to build further. Indeed, first-quarter 2020 global petroleum and liquids demand is forecast to decline from the previous quarter – the first quarterly decline in more than ten years. This will put pressure on suppliers in regions poised to boost production, such as the US shale basins, Middle East and the North Sea. A buildup of oil and gas in storage could overhang into the second quarter, causing a slowdown in completions and drilling, especially in the US shale basins, until the oversupply is corrected.

Global linepipe and OCTG consumption in 2020 is not expected to take a significant hit from the economic effects of the outbreak. Our assumption is that

activity will resume to normal levels in the second quarter and, in some cases, catch up on some lost time.

### European OCTG demand

European OCTG demand grew strongly in 2019, rising more than 30% year-on-year from 2018 levels. Fastmarkets MB research expects demand in the near term to step back modestly from 2019 and then remain stable. The growth in 2019 was mainly driven by increased wells and meterage in the North Sea – UK and Norway – but we are also seeing increased demand out of both Romania and Albania, although at relatively low tonnages to start.

Given the strength of demand in 2019 and sustained levels of consumption expected in 2020, the market could foresee an increase in prices in the first quarter of the year. This has not been the case so far as high inventories are a drag on pricing. Even with the limits on third-country imports as a result of safeguards, stocks remain too high to affect pricing to the upside.

Only in the specialist, high-alloy OCTG grades do we see any increase in price. In this case, inventories are not nearly as ample and lead times have been increasing as a result of tight demand and limited number of suppliers in the specialist market.

### Chinese OCTG consumption

Japanese mills are the main providers of high-alloy corrosion-resistant OCTG to the global markets. Stainless steel OCTG exports from Japan to all destinations in 2019 were 50% higher than in 2017, reaching over 180,000 tons for the year. With strong corrosion-resistant alloy (CRA) demand into the North Sea, offshore Gulf of Mexico and Middle East forecast for 2020, we expect that market to remain tight in terms of pricing with limited alternative supply.

For Chinese OCTG consumption, after a temporary halt to activity in reaction to the coronavirus outbreak, project execution and tendering activity should return to normal in the second quarter. Drilling plans will not be fundamentally affected and



Pipeline demand should recover later in 2020

growth in OCTG consumption is expected to increase nearly 8.6% in 2020 over 2019.

China still relies heavily on OCTG exports to maintain capacity utilization rates at the domestic mills. With the hold up in export activity due to restricted movements in the first quarter, OCTG pricing will likely be affected by discounting, especially at Tier 2 mills. The Middle East and North Africa market remains a strong target for sales, and exports will look to be competitive there.

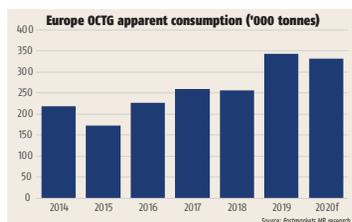
### Middle East tendering

For the Middle East region as a whole, we do not expect strong tendering activity to take place in 2020, outside of Saudi Arabia. Total OCTG consumption is expected to grow by 5% in 2020 over 2019. In 2019, there was little OCTG procurement activity by Saudi Aramco, the region's largest buyer. We expect Aramco to return to the market in 2020 with modest tendering activity (which will first go to domestic Saudi mills), but it will likely take another year before Aramco returns to more normal buying patterns and tonnages.

Otherwise, there are few large OCTG tenders upcoming in the region in the short-term. Fastmarkets MB research understands that Qatar will tender for its expansion projects at some point in the first half of 2020. Bahrain may be the most interesting market in the region for now. The country exhibited a surge in OCTG demand in 2019, rising to over 30,000 tons from around 10,000 tons in 2018. Recently, Bahrain awarded a significant OCTG contract to China's TPCO to supply up to 40,000 tons of casing over the next few years.

Tatweer Petroleum, wholly owned by Bahrain National Oil and Gas Authority (NOGA), is responsible for the country's oil and gas exploration, development and production activities. The company's portfolio includes the Bahrain oil field. This field is a mature one, which, since 2009, Tatweer has been seeking to revive by drilling new wells, debottlenecking facilities, implementing new technologies

**'Fastmarkets has noted a flurry of pipeline projects in Europe, which will keep regional linepipe producers busy this year'**



and testing advanced Enhanced Oil Recovery (EOR) pilots.

From the field, the company produces around 43 kbpd of oil, and it is looking to increase to 44 kbpd by the end of 2020. The field is a tight oil (shale) field, so Tatweer has been talking with US oil firms with expertise in fracking. Japan's JX Nippon Oil has also been in discussion to develop EOR, and Italy's ENI, in May 2019, signed an Exploration and Production Sharing Agreement to develop the offshore Block 1. Total has also signed an MOU with Tatweer for ongoing exploration and production activities.

### European linepipe demand

Fastmarkets has noted a flurry of pipeline projects in Europe, which will keep regional linepipe producers busy this year. Large-diameter linepipe consumption in the region is predicted to exceed 1.2 million tons in 2020.

Europe received an order from Gaz-System for the delivery of 36-inch LSAW pipe for the Polish offshore part of the Baltic Pipe Project. The pipe wall thickness will range from 20.6 mm to 23.8 mm. The pipeline will be covered with a special 4.2 mm thick anti-corrosion coating to protect it during its operation on the seabed, as well as 60-110 mm concrete coating.

Corinth Pipe of Greece will supply 32-inch linepipe worth €58.2 million to ICGB for the Gas Interconnector Greece-Bulgaria Pipeline this year. The contract also includes external 3LPE anti-corrosion coating and internal liquid epoxy lining.

Liberty Steel Hartlepool (UK), in conjunction with Sumitomo Corporation Middle East FZE, will supply part of the Saudi Aramco Marjan project with more than 16 km of heavy-duty LSAW linepipe from its 42-inch UOE mill.

Longer-term, Norwegian

pipeline system operator Gassco is examining the possibility of building a new pipeline to export natural gas from the Barents Sea. Production in the northern Barents Sea is liquified at Hammerfest, but Gassco has concluded that there are sufficient reserves and planned production to justify either a second LNG site or a pipeline that would run south to join up with existing infrastructure in the UK and onto Europe. The provisional costs for the pipeline are \$1.4 billion, with a final decision expected by 2022 and completion by 2026.

Meanwhile, Russian linepipe prices remain at a discount to their European counterparts as a result of market conditions. With the end of Power of Siberia, Nord Stream and TAPI shipments in late 2019, 2020 may be much quieter for the LSAW mills as Gazprom takes some time to re-orient towards a focus on repair and replacement rather than new projects. In order to maintain output rates, Russian pipe producers will seek export opportunities.

### Asian linepipe demand

In 2019, linepipe producers in Asia, especially Japan, reported low utilization rates because of reduced regional business and steep competition for supply among projects in other regions.

The end of the Australian LNG investment boom is a primary reason for the malaise in Asian demand. While there are a number of projects that are under consideration – Pluto, Browse, Scarborough, Barossa, Crux and Clio-Acme – only a couple have received the go-ahead and some will require less linepipe infrastructure than previous projects.

Nevertheless, we do expect to see some pick-up in Australian projects over the next couple of years and believe that 2019/20 will be the low for Asian regional demand, with projects in Vietnam and Malaysia also being supportive of increased volumes.

Large-diameter pipe order volumes in the Middle East region should be robust in 2020 with Aramco, ADNOC and Qatar processing tenders, while other

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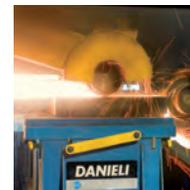
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# Marcegaglia – a worldwide leader for welded tubes

Marcegaglia confirms its leadership in the European steel processing industry with stable volumes of production and sales (-0,3%) in 2019, versus a declining market (about -4%). The company aims to consolidate its primacy, continuing its growth path through internal and external lines.

Marcegaglia launched a €600-million plan of investments over the next 5 years to strengthen the activities of its main plants.

For M&A, after the acquisition in 2018 of 80% of Novero (a cold-drawn tube mill), in 2019 Marcegaglia group, through its subsidiary Marcegaglia Plates, acquired from Evraz Group SA 100% of Evraz Palini & Bertoli, a plate rolling mill in San Giorgio di Nogaro (Udine) with 108 employees and a turnover of €216-million, specialising in the manufacturing of heavy quarto plates with over 400,000 tonnes processed every year. The company was renamed Marcegaglia Palini & Bertoli. In 2020, Marcegaglia expects to reach 5.8 million tonnes of finished products.

As far as internal capex is concerned, Marcegaglia focuses on value added products and more efficiency in the production plan. Key projects under realisation are the new highly specialised/performing cold rolling mill, two cogeneration plants, an improvement of the logistic capabilities in Ravenna, an empowerment of stainless and carbon steel tubes production and stainless steel finishing.

In June 2019 Marcegaglia group signed a 7-year loan agreement with the European Investment Bank (EIB) for €100-million to cover the costs of digitization (56%) and energy efficiency (44%) of its production plants, in support of the expansion and development programmes of its activities.

Furthermore, Marcegaglia has created an internal Academy and launched the project "A Steem for Steel" driven by Marcegaglia Foundation, which is aimed at explaining and emphasizing the importance of STEEM studies in secondary schools.

Marcegaglia is the first producer of carbon steel welded tubes in Europe and the first producer of stainless steel welded tubes in the world.

In July 2019 Mr. Enrico Paladini was appointed Sales & Marketing Director of Marcegaglia Carbon Steel Tube Division. "The short-term goal is to grow and exceed the current 1.5 million tons produced in the European plants through the implementation of the full production capacities available in some



Marcegaglia carbon steel welded tubes plant in Casalmaggiore, Italy

historical plants of the company, such as Gazoldo degli Ippoliti," Mr. Paladini says.

"Through our R&D team, synergy with all the world producers of raw materials upstream of the supply chain (slabs and hot rolled coils) will be strengthened, including a stronger integration with Marcegaglia Ravenna, that produces over 3 million tons of coils of the highest quality. We aim to transfer to the market the continuous evolution of the mechanical characteristics of the products and the best shape performances, through the research of the tightest tolerances on steel thicknesses and the development of different surface finishes, such as coated, galvanized and pre-painted steels."

In addition to the already launched new Supply Chain program, Marcegaglia wants to prepare a more performing telematics tool, Web Portal. The goal is to make available to the market in a simple and interactive way a lot of information.

Marcegaglia also launched a new project to develop its presence in the automotive sector at a multi-product level. Through the strengthening of the sales network, the creation of a dedicated supply chain and a specific R&D staff, Marcegaglia will increase sales volumes and complete the product range.

"Marcegaglia is also reinforcing its presence in the cold-drawn tube business", says Mr. Alberto Pessina, Sales & Marketing Director of Marcegaglia Carbon Steel Cold-Drawn Welded Tubes Division. "In 2020 the remaining 20% of Marcegaglia Novero's shareholding

will be acquired. Within a 3-year period the company will reach a production of over 20,000 tons of cold-drawn tubes per year, compared to the current 12,500, for a turnover of more than €40-million. Thanks to the synergies with the Boltiere plant, one of the largest in Europe for the cold-drawn tubes, Marcegaglia will remain one of the main players in the sector."

"The Forlì plant is the largest in the world for the production of stainless steel welded tubes", says Mr. Egidio Bini, Purchasing & Sales Director of Marcegaglia Specialties. "Here we recently added other new laser welding lines. In Ergene (Turkey) we are adding a new laser mill, enlarging our local production range to the industrial and dairy products with a capacity of 3,000 tons per year. In Vladimir (Russia) we will increase our production of polished tubes, installing another polishing machine."

In 2019 Marcegaglia group celebrated the 60th anniversary of its foundation with the new project of Casa Marcegaglia, a permanent museum structure in the group headquarters.

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# Tube and pipe

projects in Oman and even Jordan and Iraq will require material. Moreover, projects always require supplemental volumes that should keep the spot market active. Local large-diameter linepipe mills could also see improving utilization rates, as projects that were initially intended for international LSAW mills are diverted to local players.

## Issues to watch

In countries with well-developed domestic steel industries, safeguard measures are common and include duties, tariffs, quotas and domestic content requirements – government programs which demand a pre-determined level of domestic steel content in purchasing. The best known is the Buy America program in the USA, which requires US-made steel to be purchased for all government works projects.

The Middle East, historically a steel-short region, is moving towards that trend as regional steel production grows. This will have implications for global steel trade with the region a common target of export attention.

In the energy tubulars sector, Saudi Aramco's In-Kingdom Total Value Added (IKTVA) program is increasingly driving procurement decisions for the company. The goal is to procure 70% of services and goods by 2021 from in-kingdom suppliers.

## 'Large-diameter pipe order volumes in the Middle East region should be robust in 2020'

The program is behind schedule, but the company has made shifts in supply to move towards compliance in the first quarter of 2020. In January, for example, Global Steel Pipe was awarded the majority of the Marjan Package 4 sour service for over 100,000 tons of pipe supply.

Global was approved by Aramco for linepipe up to 1.5-inch wall thickness (WT) for sour grades in 2019 (previously it was up to 1-inch WT). Global will procure the plate from EU or Asian suppliers, but is working under fairly tight schedules for pipe delivery in April through to July 2020.

The decision highlights the importance that Aramco is placing on IKTVA. There are still more linepipe orders for offshore applications to come over the next few years, including Zuluf and Berri, but still rather short supply of competition in the kingdom. The Japanese-owned National Pipe is also certified for sour-service up to 1-inch WT. The Chinese-owned Al Qahtani plant can produce thicker wall thickness, but has only produced carbon grades to date.

Aramco continues to work with Nippon Steel on a planned HR plate mill in Saudi Arabia to further increase the value-added proportion of its procurement.

It is also stepping up domestic procurement for welded OCTG.

Arabian Pipe, from its 160,000 tpy ERW plant in Riyadh, received an order for \$46 million for welded OCTG from Aramco in December 2019, with delivery scheduled to start in Q4 2020 and through 2021. This order suggests that Aramco is going back to a more planned-delivery schedule rather than a project-based model, which resulted in swelled inventories and long stretches of no purchasing, as seen in 2019. The planned delivery schedule should support domestic pipe producers' cashflow.

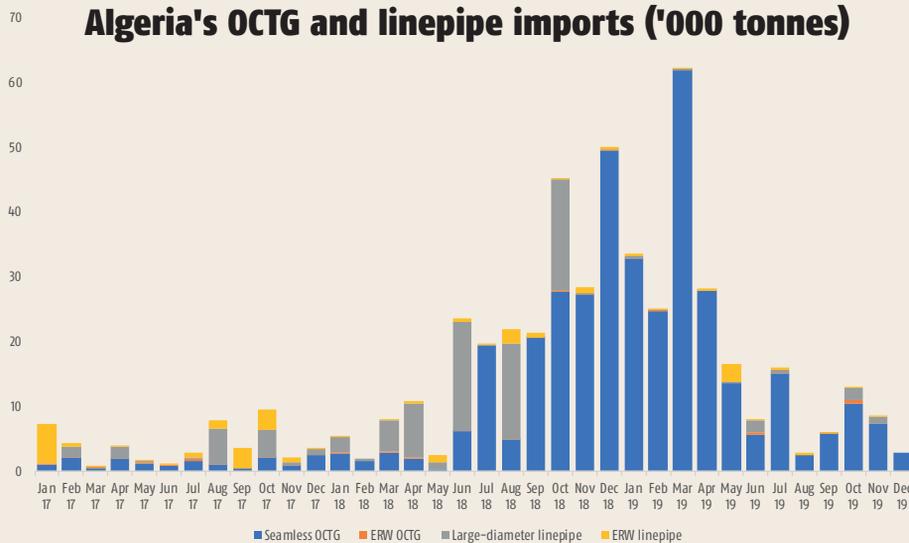
## New pipe capacity

The 240,000 tpy Al Gharbia large-diameter linepipe plant in Abu Dhabi produced its first pipe in January 2020. The JFE-Senaat JV can produce 18-56-inch pipe with a wall thickness of up to 44.5 mm and will make sour and non-sour grades up to X80, targeting both the offshore and onshore linepipe markets. The Saudi Arabian market is of interest here, but the UAE and other GCC markets are likely to be the primary destinations for the plant's output in our opinion.

Algerian consumption of ERW linepipe can reach as high as 75,000 tons annually, and there is no existing ERW linepipe facility in Algeria. Meanwhile, domestic energy development, and tubular demand, surged in 2018-19 (see chart). A proposed new ERW pipe plant in Hassi-Benabdallah is potentially in the works as a joint venture between local drilling and contracting company Tassili Forage, the US tubular producer Tejas Tubular, and US oilfield products manufacturer and distributor Summit International. The facility would make welded linepipe for the Algerian and regional market.

In Kazakhstan, Asia Steel Pipe completed the commissioning of its new 100,000 tpy spiral mill owned by a joint venture of Baoji Steel Pipe, CNPC and a Kazakh investment fund. Located in Almaty in southern Kazakhstan, it will target mainly domestic sales where CNPC is already a substantial player, as well as being a partner in the Phase II development of Kashagan.

## Algeria's OCTG and linepipe imports ('000 tonnes)



Source: ISSB, Fastmarkets MB research

# Challenging times for US energy pipe

The impacts of global economic uncertainties on oil & gas prices together with structural changes in the US tube & pipe industry are creating challenging times for OCTG and line pipe markets, reports Myra Pinkham

It is expected that 2020 will be a challenging year for the United States energy pipe market, particularly for oil country tubular goods (OCTG) and small-diameter line pipe. Even the demand for large-diameter line pipe, which has been resilient given the long lead times for pipeline projects, is expected to start waning later this year into next year with fewer new projects being announced.

This comes after 2019 had been a worst year than had been expected, with both drilling rates and pricing continuing to fall throughout the year, Kim Leppold, Fastmarkets MB's principal tube and pipe analyst, pointed out, noting that while it had been forecast to slowdown a bit, "We didn't think that weakness would continue as long as it did. We thought that it would level off midyear, but it continued to decline throughout the year."

Christopher Plummer, managing director of Metal Strategies Inc., observed that the rate of decline of apparent consumption accelerated sequentially with every passing month, especially for OCTG. He said that US OCTG apparent consumption fell by 8.1% last year after two very strong recovery years – a 43.7% increase in 2017 and a 10.1% increase on 2018.

Given that in December US OCTG apparent consumption was down by 25.7% year on year, including a 29.2% decline in domestic shipments and a 17.1%



decline in US OCTG imports, he forecast that OCTG apparent consumption will decline at a steeper rate in 2020 – about 20%, including a 23% decline in domestic mill shipments and a 15% decline in OCTG imports.

This, Plummer pointed out, is a reversal of what occurred for most of 2019. "Last year one of the few bright spots for the US OCTG producers was that the import decline had been much more pronounced – falling 16.2% – than that for domestic shipments which were just down 1.2% from 2018 levels," he noted.

Leppold forecasts that US OCTG consumption will inch up to 4.9 million metric tons this year from 4.7 million tonnes last year, and to possibly slightly over 5 million tonnes in 2021. "I don't, however, expect consumption to return to 6

million tonnes (its recent peak achieved in 2017) until sometime after 2025," she said.

### Drill rig counts

Josh Croix, chief commercial officer for Borusan Mannesmann Pipe US Inc., observed that domestic OCTG mill lead times have recently extended slightly to about three to four months even though, as of late last year, average OCTG pipe mill capacity utilization was just above 50%. "But we would need to see an increase in the rig count to keep lead times at these levels," he said.

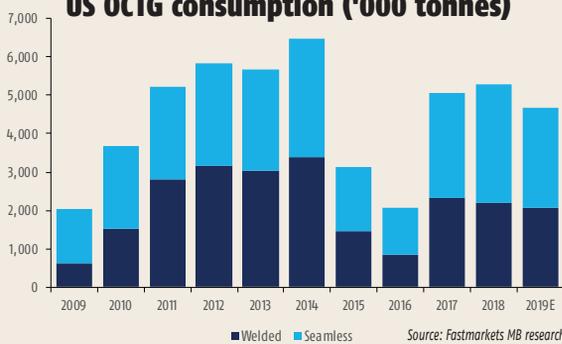
Tyler Kenyon, a metals and mining analyst with Cowen & Co., pointed out that the average US drill rig count was down close to 10% in 2019. "Because of that, we are currently seeing a rig count – at 791 rigs as of mid-February, down from 1,047 rigs a year earlier – that would indicate about a 15% decline from the average 2019 levels, which will likely continue to put pressure upon the energy pipe supply chain – distributors and mills alike."

While the US rig count seemed to bottom out late in January, Croix said that he does not expect it to increase sharply anytime soon, given the scrutiny that energy exploration and production (E&P) and energy service companies are under to operate more efficiently.

Leppold said that she thinks that the rig count will most likely fluctuate somewhere between the high 700s and about 850 rigs depending upon energy prices and the earnings of the E&P companies, but she does not expect that there will be a big change in demand – especially on the upside – in 2020.

"There are also some external factors that could come into play," Croix said, noting that fear about the impact of the coronavirus caused West Texas Intermediate (WTI)

## US OCTG consumption ('000 tonnes)



crude oil prices to fall to just under \$50 per barrel in early February, before coming back to \$52/barrel as of mid-February.

Paul Vivian, a partner at Preston Pipe, agreed, stating that the future impact of the coronavirus upon the market remains a wildcard, given that at this point it is still unknown how long it will continue to be a threat and what the economic impact will ultimately be. “It could result in a 20-25% decline in crude oil demand just in China over the next several months, which is a big deal,” he said, adding that – given the potential for the virus to spread elsewhere in the world and for it to have a further impact upon energy prices, including WTI oil prices – even just the uncertainty is having an impact upon US energy prices and, more generally, the US energy pipe sector.

### Structural changes

While energy prices continue to be important, some industry observers argue that they are not as much of an important indicator of OCTG demand as they had been in the past. Kenyon pointed out that WTI oil prices have actually been more or less range-bound between the low-\$50s and mid-\$60s per barrel over the past year. This, Leppold said, is slightly above what is considered to be the profitability breakeven price of \$40 to \$50 per barrel.

But the biggest impact is said to be the structural change in the exploration and production (E&P) company, or drilling company, investment strategies. “The days of E&Ps pumping more and more oil at a lower profit are now over with Wall Street investors falling out of love with the energy sector,

**‘It will be the survival of the fittest this year’**

questioning why they should invest there if they can get better returns elsewhere,” Leppold explained, adding that because of this everyone in the energy sector has had to tighten their belts.

The impact, however, has not been universal. “Because of this a lot of wildcat companies are exiting the market and large companies, such as Chevron and ExxonMobil, taking bigger stakes in shale plays, especially the Permian Basin, as they are more financially sound,” Plummer pointed out.

With the recent challenging business conditions, there has been a concerted effort to drawdown OCTG inventories on a monthly basis ever since mid-2018. Despite this, Kenyon estimated that distributors are still holding somewhere between 4.0 and 4.5 months of supply, which is still a little bit on the high side versus their target of three to four months of supply on hand. It is, however, expected that they will be closer to being in balance soon, possibly by sometime in the first half. Croix said that pipe mills have already seen a slight pick-up in demand because of this destocking.

### Capacity utilization

Meanwhile, Leppold pointed out that generally US OCTG capacity utilization has been declining, although that varies mill by mill. Croix said that some older facilities, or mills that were not operated very efficiently, have been stepping down production, or are being shut down or idled until better pricing occurs.

The impact, however, has been moderated to some extent with some additional capacity with the restart of the former US Steel Lone Star welded OCTG facility in Bellville, Texas, and the ramping up of a new mill in Houston by SeAH Steel USA.

There has also been some industry consolidation – most notably with Tenaris acquiring the Ipsco US assets from OAO TMK, which has resulted in the shuttering of some welded OCTG capacity there. Leppold said that the “jewel in Ipsco’s crown” was its steel and seamless pipe mills in western Pennsylvania, which are giving Tenaris a bigger presence in the

Northeast, adding that the acquisition has also given the company a domestic round billet source for its Bay City, Texas, seamless pipe mill. However, Tenaris has suspended operations at Ipsco’s welded pipe mill in Blytheville, Arkansas, and announced that it is laying off workers at its Wilder, Kentucky, facility.

It is possible that Tenaris’ acquisition will change the landscape of the OCTG market as Ipsco is gradually integrated, Leppold said, given that 75% of Tenaris’ pre-acquisition North American production had gone through their rig direct program and it is assumed that at some point the Ipsco tonnage could also be shifted away from the distributor market.

Overall, Vivian said that its Ipsco acquisition will make Tenaris more of a powerhouse in the US OCTG market, giving the company more leverage in terms of price, which would be positive for the overall market. He says that this, however, is not an indication of further consolidation in the domestic OCTG market, since the Ipsco assets were for sale for a while and other pipe mills has shown little interest in buying them.

### Prices bottom out

After declining for the past 18 months, it appears that prices of both OCTG and line pipe have now bottomed out and are starting to move up. “But I’m not bullish that there will be a big rebound,” Leppold said.

There have, however, been a few moves by domestic mills to increase OCTG prices – a \$50 per short ton price hike that went into effect January 1, which was followed in the beginning of February with Vallourec USA floating a \$75 per ton hike with a March 1 effective date that as of mid-February had not yet been followed.

Croix said that since prices are coming off a pretty hard bottom, the initial hike was even more successful than usual. He also said there is a need, especially by less efficient mills, to pass along raw material price increases, especially HRC prices for welded mills. HRC prices, however, are projected to flatten ▶



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# Tube and pipe

out this year, or even decline slightly, with Kenyon forecasting that they will average about \$590 per ton for the year, going from about \$600 per ton early in 2020 to the mid-\$500s per ton later in the year. As of February 21, they had already eased to \$585 per ton from \$595 per ton at the beginning of February.

“It will be the survival of the fittest this year,” Croix said, with the more efficient US OCTG mills that can offer more grades and connections being the ones that survive.

The story for small-diameter line pipe – under 16-inch diameter pipe that is largely used for gathering lines as well as connecting pipelines to new construction – is similar to that for OCTG, Vivian said, observing that small-diameter linepipe demand was down by about 15% last year.

There are conflicting views, however, about the direction it will take this year. While Leppold said that a rising completion rate for drilled but uncompleted wells (DUCs) will spur additional demand for gathering lines, Croix observed that even with the recent destocking there has still been a small-diameter line pipe inventory overhang thus far this year, and more than for OCTG. That has resulted in some mills changing to a “roll to order” policy.

Such pipe, however, only accounts for about a third of all line pipe volume, Plummer estimated. He said that US apparent consumption of large-diameter line pipe increased by 10.6% last year on top of the 16.0% pick-up in 2018 after the market bottomed out in 2017.

## Linepipe demand

Croix said that he believes that 2019 was the end of a big wave of large-diameter line pipe inquiries and new project announcements. “Much of that pipe has mostly been purchased for pipelines under construction,” he said, “But this year inquiry levels have come down and we are predicting a lull in activity through 2022.” He said that some pipelines bringing natural gas to liquefied natural gas (LNG) export facilities will continue to be built over the next few years, but at a slower pace than in the past year or so. Also, much of the buildout of cross-border pipelines from the US to Mexico has already been completed.

Large-diameter line pipe demand, however, should continue to hold up at least through the first half of this year, another US line pipe executive predicted. “But current commodity prices don’t support much growth,” adding that this is especially the case for natural gas pipelines. “Oil prices aren’t terrible but natural gas prices are wretched, the lowest they have been in many years,” at \$1.81 per MMBtu as of mid-February.

“While there is still some need for more pipeline infrastructure – even in the Permian Basin, but especially in the Northeast,” Leppold said that such project work is moving very slowly given concerns about the presidential election and how permitting could be affected. Also, while President Trump has promised the fast tracking of pipeline projects, that has not gone as quickly as expected, given that a lot of it is in state and local control,

## ‘The global LNG market is now a bit oversupplied and there has been a bottleneck with the building of LNG import facilities’

not federal control. “He can’t just do this through executive orders,” she said.

Beyond that, Vivian said that the biggest hold up, especially for certain pipeline projects, such as the Keystone XL pipeline, is due to community resistance and protest. He noted that while it generally takes a long time – about 15 to 36 months – to bring a new project on-stream, Keystone XL has been going through the approval process for about eight years.

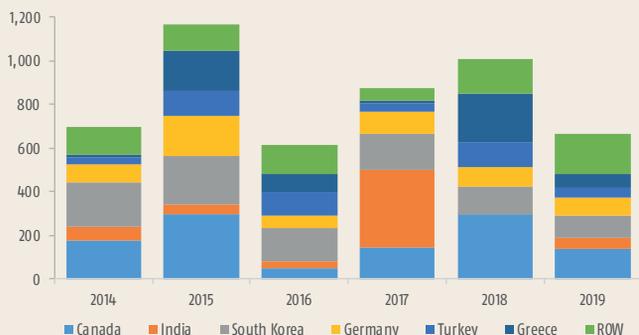
At this point companies are now fulfilling pipeline projects that are already on the books, much of which was the result of constrained takeaway capacity in the Permian basin, but Vivian said it is now forecast that that the takeaway capacity there will be in excess within another year or so because of drilling cutbacks.

There also continues to be some potential for additional pipelines to bring natural gas to LNG export facilities, the pipe mill executive pointed out. But even that is expected to progress at a slower pace over the next few years, Leppold said, as the global LNG market is now a bit oversupplied and there has been a bottleneck with the building of LNG import facilities to re-gasify the LNG overseas.

On pricing, Croix said that while there have been some small-diameter line pipe price increases, they have not stuck as well as they have for OCTG. Large-diameter line pipe prices have been more resilient through the most recent wave of activity, given that the great majority of large-diameter line pipe – 95-98% by some estimations – is project-, and therefore contract-, driven.

Vivian said that overall 2020 will be a mediocre, but still acceptable, year for the US energy pipe market overall, although he said that it remains difficult to forecast given that it will be driven by several outside factors. That not only includes what happens with the US and global economies and the negotiation of future trade agreements, but what impact the coronavirus will have upon commodity prices and pipe demand.

## US large OD linepipe imports



Note: ('000 tonnes, 2019 ytd through Oct)

Source: ISSB and Fastmarkets MB research

# New projects aplenty

Plenty of new plant projects contributing to production in the tube & pipe sector globally are under way or have started up recently. Here is a quartet of examples

### LSAW plant starts up

Al Gharbia Pipe Company has successfully started up its new longitudinal submerged arc welded (LSAW) pipe plant. The large-diameter pipe production facility is in the Khalifa Industrial Zone Abu Dhabi (KIZAD), UAE, and was built by a consortium of Larsen & Toubro Limited and SMS group as the engineering, procurement and construction partner. The pipes it produces will mainly be in grades suitable for use in onshore and offshore linepipes, including sour-gas applications.

Al Gharbia will produce up to 12.2-meter-long pipes with outside diameters ranging from 18 to 56 inches. The maximum wall thickness is 44.5 mm. Steel plates up to grade X80 can be processed.

SMS group was responsible for the engineering and supply of the process equipment for the large-diameter pipe production facility. Larsen & Toubro Limited was responsible for the civil works, balance-of-plant and erection of the equipment. In addition to the core equipment, SMS group's scope of supply included workshops, laboratories and a manufacturing execution system (MES).

The production line comprises an edge-milling machine, a crimping press, a second-generation JCO® pipe-forming press with modular frame design, tack-welding machine, inside and outside welding machines, mechanical expander and a hydrostatic pipe tester.

The JCO® pipe forming process enables the plant operator to change over quickly to other pipe dimensions, allowing even smaller batch sizes to be produced economically and precisely, notes SMS group.

The shape automation system developed by the plantmaker directly determines the optimal machine parameters and fully

automatically controls the forming process. The system minimizes the effect of yield strength deviations in the plates during forming to provide consistently high pipe quality.

The JCO® pipe forming press and the crimping press are equipped with variable-speed pumps to enable an efficient hydraulic system. Abrasion is thus reduced and hydraulic pressure losses are minimized, SMS group reports. Further benefits are short piping paths and small oil tanks as well as the possibility to feed compression energy back into the network as electrical energy. Compared with conventional hydraulic systems, this is said to reduce energy consumption by up to 50%.

Al Gharbia Pipe Company will manufacture large-diameter longitudinally welded pipes made of quality steels that will mainly be used for the energy sector in

markets such as Bahrain, Kuwait, Oman, Saudi Arabia and the UAE. The company is a joint venture of investment company Senaat, JFE Steel and Marubeni-Itochu Steel (MISI). SMS group explained that the new company is making use of JFE Steel's technology for high-quality large-diameter longitudinal welded steel pipes, MISI's sales capabilities and Senaat's industrial expertise in Abu Dhabi.

### Bright annealing stainless pipes

Joint Stock Company Pervouralsk Pipe Plant, Russia, has ordered a new roller hearth continuous furnace system, for bright annealing stainless steel pipes in a 100% hydrogen atmosphere, from Tenova LOI Thermprocess, which is based in Germany.

JSC Pervouralsk Pipe Plant is a subsidiary of the ChelPipe Group and specializes in the production of stainless steel tubes for a wide variety of industrial uses. Tenova LOI Thermprocess roller hearth furnaces for the heat treatment of pipe material are described by their supplier as ideal for the continuous production of larger throughputs.

"This extremely flexible furnace type is characterized by uniform heating, a definable holding time and subsequent material-specific cooling," states Tenova LOI Thermprocess. "The high temperature uniformity and the low energy consumption of these systems ensure reproducible processes, which can be precisely adapted to the desired heat treatment of the material," it adds. The drive sections can be optimally matched to the respective annealing process.

The heat treatment system for the JSC Pervouralsk Pipe Plant is designed to bright anneal 2 tonnes per hour of austenitic stainless steel and nickel-based alloy pipes. The solution annealing of these high-alloy steel grades is achieved in



Al Gharbia Pipe Company has started production on its new LSAW pipe plant



TENOVA

**Continuous roller hearth furnaces allow precise control of the bright annealing process**

the temperature range of max. 1,100-1,200°C. The tubes are heat treated in this continuously operating roller hearth system by using a 100% hydrogen atmosphere as process gas.

The scope of delivery includes installation and monitoring of commissioning by specialists from Tenova LOI Thermprocess.

**Wide plate mill modernization**

Algoma Steel’s as-rolled and heat-treated plates span a wide variety of grades and sizes. Within its range, the company serves applications such as oil country tubular goods, linepipe, drill and pipe casing, wind towers and steel storage tanks.

Danieli, including Danieli Automation and Danieli Taranis, is providing a complete upgrade of the 166-inch wide plate mill of Algoma Steel in Sault Ste. Maire, Ontario, Canada.

The plantmaker notes that the project will allow Algoma to expand its product portfolio to include wider plate products, to better control shape and surface quality, and to improve logistics – making it possible “to offer enhanced ship on time performance.”

The plant will be re-automated completely by Danieli Automation, from Level 0 through to Level 2 systems. Along with new process equipment and new digital drives, this will allow Algoma to

perform normalized, highly controlled rolling so that it can supply new grades of plate to the shipbuilding, energy and bridge-building sectors. Danieli Taranis will provide engineering and post-commissioning support.

Danieli will overhaul the complete plant automation system – from the reheat process to finished goods – and will install a new primary de-scaler, a new hot-leveler and a new cooling bed. A new dividing shear, piling system, ‘top-to-bottom’ automated inspection system and plate-marking machine will upgrade the finishing area.

Work began in October last year and will conclude in the Canadian summer of 2021. All work will be carried out in stages during routine downtime to ensure no impact to operations or shipments.

**Crimping press commissioned**

Voestalpine Tubulars GmbH & Co KG, based in Kindberg, Styria, Austria, has commissioned a three-die crimping press supplied by SMS group.

The new press replaces a predecessor model supplied by SMS group over 20 years ago. The plantmaker says the new press will assure Voestalpine Tubulars of an increase in plant availability and a higher yield. With the new press, the company will be able to further optimize crimping geometries and reduce set-up times.

The entire crimping cycle – performed in combination with the associated auxiliary equipment – has been reduced to just 17 seconds. Crimping forms metal plate into a dish without reducing the thickness of the plate.

Modern hydraulics and control systems

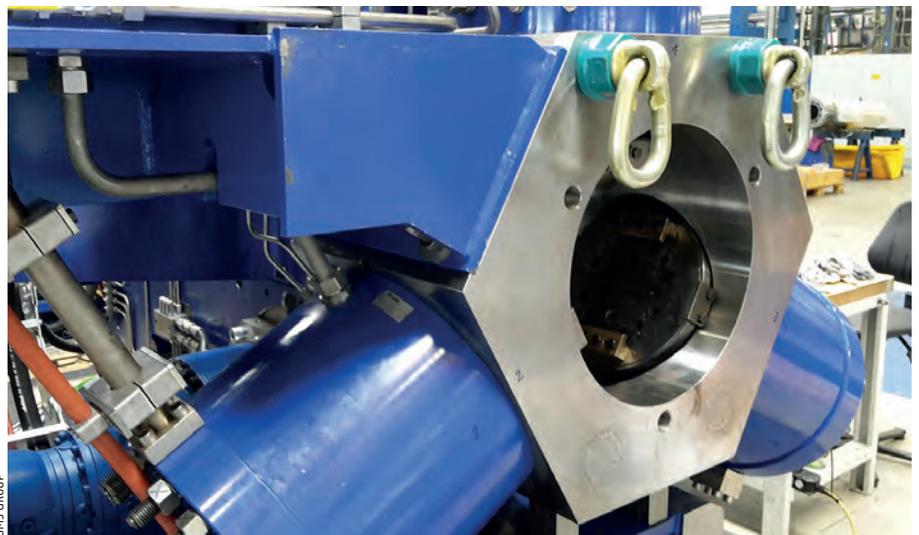


DANIELI

**Danieli is undertaking a major upgrade to Algoma’s wide plate mill in Canada**

and three-way-controlled hydraulic cylinders enable Voestalpine Tubulars’ new press to achieve the crimping centrally in very short cycle times. This process induces no shear stress into the material and there is no buckle formation in between the crimping dies. This results in a substantial improvement in the crimping shapes of the wide range of very different hollow geometries, notes SMS group.

The new crimping press is part of the cross piercing elongating line on which Voestalpine Tubulars manufactures high-grade tubular products for a broad range of applications.



SMS GROUP

**SMS group supplied a three-die dishing press to voestalpine Tubulars**

# Oilfield minerals face falling US drilling activity

Markets for oilfield minerals like frac sand and barite are being influenced by national policies and international trade, reports William Clarke



Oilfield minerals, the clays and proppants used in drilling and extracting oil, are a crucial part of the petrochemical industry, and demand for these minerals correlates closely to drilling rates. Barite and bentonite are used in drilling fluids, while silica sand is crucial in the fast-growing fracking industry.

The key proxy for oilfield minerals demand is the number of active drilling rigs worldwide. More active drilling rigs means more mud going down-well, and greater demand for minerals. The Baker Hughes rig count, produced by one of the largest oilfield services companies in the world, is widely

used as a measure of oilfield activity, and therefore as a proxy for oilfield mineral demand.

The progress of the figures in the Baker Hughes rig count painted a gloomy picture for frac sand demand in the US over 2019, but the situation for high-grade barite was more positive. The number of active drilling rigs in the Permian Basin, the center of the US fracking industry, was reported at 408 on February 14 this year, down by 14% year on year. The total number of active drilling rigs across the entire US had fallen to 790 on February 14, down by 25% year on year and the lowest level since early 2017.

This fall in activity, particularly in

the Permian basin, is bad news for frac sand demand. Frac sand is a key element of the hydraulic fracking process. It is injected into the well at high pressure, creating fissures in the rock. The sand props open the cracks, allowing oil or gas to flow out.

## Permian problems

The Permian fracking industry has faced a range of problems quite separate from global oil prices. One issue dogging the region has been a shortage of offtake capacity. With oil pipelines running at capacity, there has been no way to move more oil out of the region for refining. This has led to a shortage of local storage, and plummeting prices at the wellhead.

Another issue has been gas offtake. Fracked Permian wells tend to produce mostly oil at first, but as they age they produce ever more gas. Owing to the shortage of gas pipelines in the region, most of this gas is "flared," meaning that it is simply vented into the air. Until 2019, environmental limits on gas flaring had put another cap on oil production, discouraging new projects.

In 2019 these restrictions were eased by the administration of US President Donald Trump, as it rolled back the country's Waste Prevention Rule. Since then, gas flaring and venting has been at near-record levels, but legislators in the US states of Texas and New Mexico have been stepping into the gap left by federal regulators, adding another risk to new oil projects.

This problem will be eased by a planned increase in gas pipeline capacity, but this is taking longer to deliver than expected. In October 2019, oilfield infrastructure

**Lower rig counts have signaled weaker markets for oilfield minerals**

company Kinder Morgan pushed back the expected opening of its massive Permian Highway gas pipeline to 2021, citing red tape. Another issue troubling Permian production has been very high costs for road freight, as well as a host of other logistical bottlenecks, including a shortage of hotel rooms for oilfield workers.

This muted demand outlook, combined with a lingering overhang of supply from the production boom in 2018, weighed heavily on frac sand prices last year. Fastmarkets' latest price assessment for frac sand, northern white, 40/70 mesh, API, exw Wisconsin, was \$29-34 per short ton in February 2020. This was less than half the value that was widely reported in early 2018 before Fastmarkets began assessing the price in 2019.

This has taken a toll on frac sand producers, and in 2019 there was a slew of mine closures and bankruptcies, which shows no sign of abating in 2020.

In July 2019, Emerge Energy Services, which mines frac sand through its subsidiary Superior Silica Sands, filed for Chapter 11 bankruptcy. In August that same year, another US-based producer Shale Support announced it would also file for Chapter 11. Shale Support has a total frac sand capacity of 5 million stpy and has operations in the US states of Oklahoma, West Virginia, Louisiana, Pennsylvania and Ohio.

Also in August, the sand miner and logistics company Hi-Crush announced it was mothballing its production facility in Whitehall, Wisconsin, US, which has 2.8 million short tons per year of capacity.

### Better for barite

The picture for other oilfield minerals going into 2020 looks more positive. The Baker Hughes international rig count, issued monthly, has seen a slight increase over the past year.

The total number of active rigs in the world, excluding North America, was reported at 1,104 in December 2019. This was an increase from 1,024 a year earlier, and from 954 at the end of 2017. In

particular, there has been strong growth in offshore drilling, with 257 active rigs in December 2019, compared with 191 two years before that, which is supportive for barite demand.

Barite is used for drilling mud because it is soft, non-magnetic, and crucially it is very heavy. The heaviness of barite helps to maintain pressure in the hydrocarbon formation that is being drilled into. If this pressure is not managed then oil or gas can be pushed back up the well in a catastrophic blowout.

The International Petroleum Association sets the specifications for drilling-grade barite. The original specifications included a specific gravity (SG) of 4.2. This remains the most commonly used grade of barite for offshore drilling. But onshore drillers are more flexible about their requirements, and can use barite of SG 4.1. The US Geological Survey launched an SG 4.1 spec in 2010 for this market. Oilfield service companies also buy lower grades of barite, and blend them to achieve the desired SG.

For this reason, large offshore drilling projects are the main driver of demand for API-grade SG4.2 barite. Onshore activity tends to use SG4.1 or lower-grade barite.

But despite good demand, barite prices have been kept in check by the availability of high-quality Indian material. Indian barite exports are running at nearly twice the pace of Chinese sales, according to the latest customs data, marking a sharp reversal from only two years earlier, when China was the largest exporter.

In the period between April and December 2019, India exported 1.51 million tonnes of lump barite. China imported just 823,420 tonnes over the same period.

In the year starting April 2018, India exported 2.1 million tonnes of barite, compared with Chinese exports of 1.31 million tonnes. This marks a sharp change in export rates from the previous year. In the 12 months to March 2018, Indian exports were just 1.65 million tonnes, compared with Chinese exports of 1.99 million tonnes. Back in 2014-15, Indian exports were just 652,000 tonnes,

compared with Chinese exports of 2.48 million tonnes.

Chinese barite is increasingly less competitive in international markets, due to higher domestic consumption pushing up prices. Fastmarkets assessed the price of barite, API, SG 4.2, unground lump, bulk, fob China at \$94-100 per tonne on January 30, up from \$89-93 per tonne in the prior month.

Chinese material is the most commonly traded, but many drillers in the Middle East prefer Indian material, particularly for offshore applications. The reason is one of consistency and quality. China has hundreds of active barite mines, some with very low capacity. This diversity of origin means that Chinese material is variable in quality.

Indian barite, on the other hand, is mostly sourced from a single massive mine, the Mangampet project in Andhra Pradesh. This material is of a very predictable quality, a boon for traders, grinders, and end users, who can predict exactly what kind of mineral they will use.

Indian exports up until 2017 were stymied by an inflexible price system. The resource at Mangampet belongs to the Andhra Pradesh Mineral Development Corporation (APMDC), itself owned by the state government of Andhra Pradesh. This material was made available to exporters on a tender system, which made Indian material expensive relative to China or Morocco.

Buyers in Saudi Arabia and other Middle Eastern destinations continued to pay a premium for Indian material, helped by the relatively cheap freight rates between those places, but exports of high-SG barite from India to the US stopped almost entirely. A reform to the existing tender system was announced in late 2017, empowering the APMDC to review prices more regularly, with input from market participants.

Fastmarkets assessed the price of barite, API, SG 4.2, unground lump, bulk, fob Chennai, at \$89-92 per tonne on January 30, narrowing upward by \$1 from \$88-92 per tonne a month earlier.

**'There has been strong growth in offshore drilling, with 257 active rigs in December 2019'**

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# Fluorspar's value chain could rebalance

The supply chain in the fluorine market has been disrupted since the outbreak of the novel coronavirus (2019-nCoV) in China. Factories and mines in the country have been slow to restart their operations after the extended Lunar New Year break because employees were told not to return to their workplaces in order to help contain the outbreak.

Limitations on logistics movements were also put in place. Trucks and their drivers could not cross provincial borders, making supply chain logistics particularly difficult. The global market is well supplied, with many non-Chinese consumers reporting to Fastmarkets that they have stocks left over from 2019 because sales did not reach expected levels. This caused one non-Chinese consumer to continue to run his factory at 60-70% of capacity.

Similarly, some factories are not operating at nameplate capacity because of poor pricing and demand in key acidspar end markets, such as fluoropolymers and refrigerants. The limited activity in the fluorspar market, both upstream and downstream, could help rebalance the market.

The border between China and Mongolia is closed, a source told Fastmarkets. "The traffic restrictions in China have been largely lifted and when the traffic gradually returns to normal in the whole country in April, the whole fluoride industrial chain will rise by 5-10% or more," one Chinese fluorspar producer said.

The supply of downstream companies to their customers will not be affected too much in March since fluorspar consumers have enough stock, but end market prices have begun to rise, a seller source said. The slowing of the

## Fluorspar's sluggish global value chain could be boosted by the impacts of coronavirus in China, reports Michael Greenfield

logistics supply chain could tighten supply.

Mongolia produces large volumes of fluorspar and the majority of the material makes its way into China to either be consumed or exported. Mongolia exports all of its fluorspar, which in 2018 totaled around 550,000 tonnes. More than 350,000 tonnes of this went to China, with the remainder going to Russia, according to data from Mongolia's Ministry of Mining.

Global fluorspar supply is just shy of 6 million tonnes, according to industry consultant Roskill. The global fluorspar market has also been impacted by weaker demand for fluorine-derived products.

In the latest round of contract talks, consumers were able to negotiate prices down against last year's contract prices.

Fastmarkets' price assessment for fluorspar, acidspar, 97% CaF<sub>2</sub>,

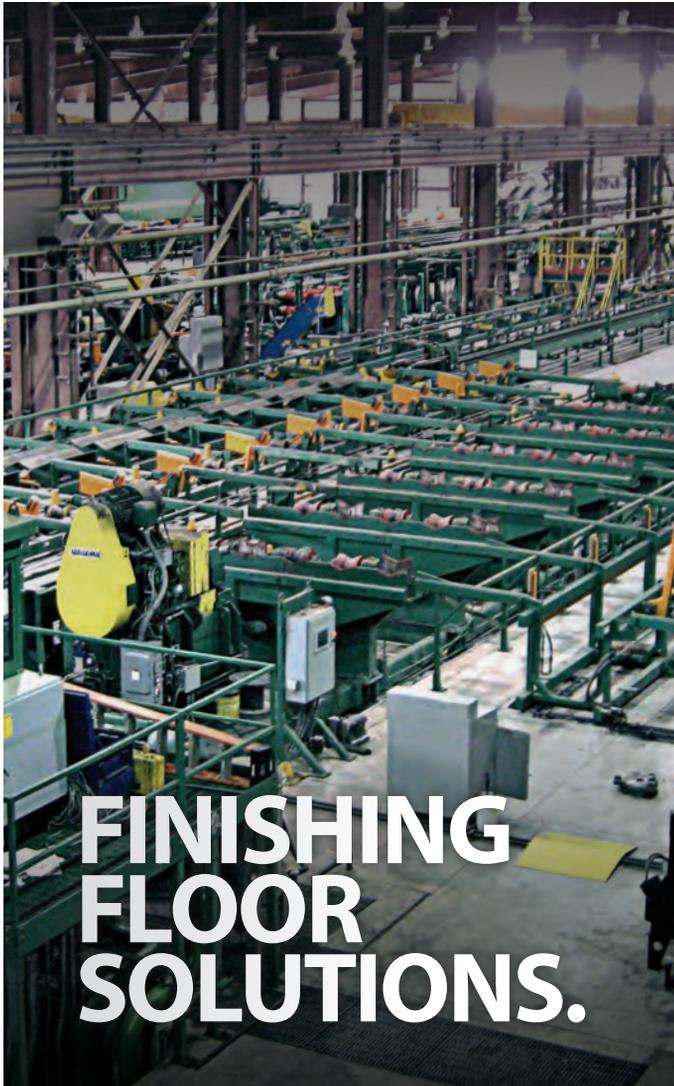
wet filtercake, fob Durban, was \$350-410 per tonne on Thursday January 30, down from \$400-450 per tonne in the previous assessment on December 26 and off from \$440-490 per tonne in late November. The November price had been largely unchanged for nearly a year, only widening downward by \$10 per tonne in March. Year on year, the price has declined by \$90 per tonne, or 19.1%, based on the current midpoint of \$380 versus the midpoint of \$470 on Jan 31, 2019.

The price reduction was due to weak end-market demand and pricing. "The acidspar producers kept prices as high as they could, but the aluminium fluoride [AlF<sub>3</sub>] prices went very low, so there was a need for an adjustment in the raw material price," an aluminium fluoride producer said. "We have seen a decrease of 20-25% [in the price of fluorspar]. \$100 per

**Until business returns to normal in China after novel coronavirus subsides, supplies of minerals are likely to tighten**



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tonne looks a little too big of a jump, but considering prices were close to \$500 per tonne last year, it might be about right," this source added.

Historically, Chinese acidspars had always commanded the highest price because its quality was usually guaranteed and Chinese suppliers had the volume to supply the international market. While it is still the case that Chinese material is the most expensive, the premium which it commands over acidspars from other locations has diminished.

Mexican material was typically cheaper by comparison due to high arsenic content, which made it unsuitable for many consumers due to the increased downtime it causes for the consuming plant.

Fastmarkets price assessment for fluorspar, acidspars, 97% CaF<sub>2</sub>, wet filtercake, fob China was at \$400-450 per tonne on February 20. Fastmarkets assessment for fluorspar, acidspars, 97% CaF<sub>2</sub>, wet filtercake, fob Tampico was at \$380-450 per tonne. The two prices are almost identical.

Prices two years earlier were \$480-520 per tonne for Chinese acidspars and \$360-380 per tonne for Mexican material, marking a \$100-per-tonne differential between the top end of Mexican and the bottom end of Chinese fluorspar. These price movements have brought a convergence of global prices.

Prices for Mexican material have increased because the market was undersupplied last year and the sole producer in Mexico managed to maintain its price level, citing good long-term demand for fluorspar despite the short-term weakness. Chinese acidspars prices have softened after reaching record highs following the environmental inspections, which created tightness in the market.

Should the current situation in China continue, it could further tighten supply. This would place upward pressure on the fob China price. But this might boost the downstream industries that have performed badly in the past 12 months due to oversupply and illegal refrigerant trade, which has hurt many of the refrigerant producers' sales.

**Fluorspar – China (\$/tonne\*)**



**Fluorspar – Mexico (\$/tonne\*)**



## China remains a net exporter of acidspars

Acidspars exports from China fell against the previous year and imports rose, but the nation is still yet to become a net importer of 97% CaF<sub>2</sub> fluorspar, according to the latest trade data from China's Customs Bureau.

Continued environmental inspections in China since early 2018 have taken acidspars out of production, hastening market expectations that China would move to become a net importer of fluorspar. Local inspections took up to 600,000 tonnes of production out of the market, according to Roskill. Subsequently, there has been a push from Beijing to develop downstream, value-added, industries.

But China remains a net exporter of the acid-grade material. Chinese exports totaled 190,600 tonnes in 2019, down from 201,000 tonnes in the previous year. Meanwhile, the country imported 130,140 tonnes of the material in 2019, rising from 91,000 tonnes of acidspars in 2018. This means the acidspars export surplus is 60,000 tonnes for 2019, down by 50,000 tonnes or 45.5% year over year.

Fastmarkets assessed the price of fluorspar, acidspars, 97% CaF<sub>2</sub>, wet filtercake, fob China at \$400-450 per tonne on February 6, stable since October 2019. The price is back at a similar level to before the environmental inspections in China hit the fluorspar mining sector and created a supply shortage. It rose to a peak of \$550-580 per tonne in December 2018 from a price of \$400-420 per tonne in January 2017.

In the metspar market, imports totaled 567,500 tonnes, up by 35% from 420,000 tonnes imported over 2018. China exported 183,500 tonnes of metspar, down from 202,000 tonnes in 2018.

This leaves the overall balance of fluorspar at a net import of 323,540 tonnes.

### High import prices

Chinese imports could have been higher in 2019 had overseas prices not been so high. The contract-driven markets settled prices around November 2018 which then held for the next 12 months.

Fastmarkets' price for fluorspar, acidspars, 97% CaF<sub>2</sub>, wet filtercake, fob Durban was \$450-490 per tonne between November 2018 and November 2019. This was the highest price since Fastmarkets started assessing acidspars from South Africa in 1989. Chinese consumers and traders reported being unable to purchase material at this price as they would also need to add VAT and import duties on top, 16% on top of the unit price of fluorspar.

That price has since softened to \$350-410 per tonne, as of January 30.

Last year China started making regular imports from Mexico. Additionally, the two newest producers to the market, Sepfluor and Canada Fluorspar, have both been in contact with companies in China over making shipments.

### China's performance

China had a mixed year for acidspars consumption. Its downstream sector is the largest in the world, and accounts for roughly half of global fluorspar consumption, but its refrigerant market performed poorly for almost the entirety of the year.

Hydrofluoric acid prices suffered this year while non-Chinese fluoropolymer producers reported that prices were down by around 25% because of oversupply from China.

Market sources told Fastmarkets that Chinese aluminium fluoride producers are organizing a production cut to rebalance the market and prices, which currently sit at \$1,100 per tonne. This is down from prices of around \$1,600 per tonne a year ago.

# Mauritanian kaolin

A new and undeveloped kaolin deposit was evaluated in Mauritania during the course of a cooperation project between the German Federal Institute for Geosciences and Natural Resources (BGR) and the Mauritanian State Office for Geological Research (OMRG)

Up to the present, geological and mineralogical information on kaolin occurrences in Mauritania was virtually non-existent. The country has no history or record of kaolin mining. However, during the course of a recently conducted, German government-funded cooperation project between BGR and OMRG, an extensive kaolin deposit was discovered in southern Mauritania. The deposit at Hassi Abyad is situated about 120 km north of the Senegal River, and 50 km east of the district capital M'bout. It is the first indication of a potential for kaolin mining in the country.

## Occurrence

The kaolin at Hassi Abyad outcrops over several square kilometres in a slightly inclined and poorly vegetated penepplain. The kaolin is either directly exposed on surface or covered with a thin veneer of recent sands and silts or with float of ferricrust fragments. The kaolin ultimately derived from the weathering of schistose metasedimentary rocks of the Upper Precambrian to Paleozoic "Mauritanides" Fault and Thrust Belt. The deposit likely represents the erosional remnants of a mature lateritic regolith or an accumulation of redeposited "secondary" kaolin.

## Mineralogical characteristics

Samples of Hassi Abyad kaolin consistently show high to very high contents of kaolinite (70–98%), with minor quartz, goethite, anatase, crandallite/svanbergite, hematite, and rutile. Based on 37 samples derived from exploration drillings an average kaolinite content of about 85% was determined by XRD. Minor components



Outcropping kaolin at Hassi Abyad

were quartz (8%), goethite (3%), hematite (0.5%), rutile and anatase (1.5%), and a mineral from the crandallite group (0.7%). Electron microscopic studies revealed a rather small primary particle size of most of the kaolinites (<0,5µm).

## Geochemical composition

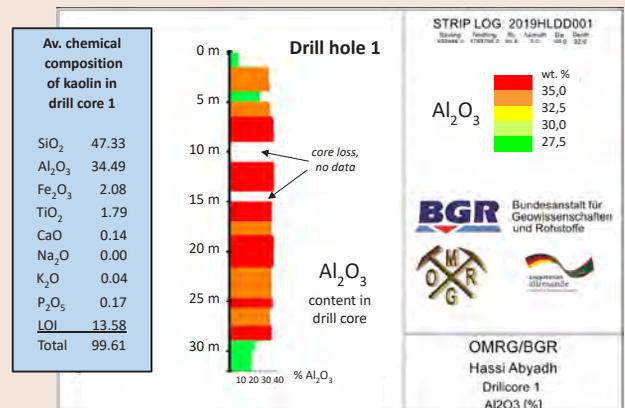
The Hassi Abyad deposit was explored in a first approach by drilling 100 auger drill holes in the northern part of the

deposit (surface area of 800 m x 1200 m with depths between 4 and 10 m). Composite drill hole samples were taken along 1 m intervals. Geochemical analysis of 360 drill samples revealed an average Al<sub>2</sub>O<sub>3</sub> content of 33.5%. The Hassi Abyad kaolin is very low in alkalis, while Fe<sub>2</sub>O<sub>3</sub> (x = 3.16%) and TiO<sub>2</sub> (x = 1.88%) are the major impurities. The elevated mean value of Fe<sub>2</sub>O<sub>3</sub> originates from the upper 1–2 m in the boreholes, which usually have high values > 4% Fe<sub>2</sub>O<sub>3</sub>.

A second drilling program was conducted in early 2019 with 57 wide-spaced auger drill holes in the central and southern part of the deposit, covering an area of approximately 5 km<sup>2</sup>. The auger drill holes reached depths of up to 20 m without intersecting the base of the kaolin. Additionally, 5 diamond drill holes were sunk. Drill hole 1 reached a depth of more than 30 m. The core consistently shows high grade Al<sub>2</sub>O<sub>3</sub> contents >32.5%, with lower Al<sub>2</sub>O<sub>3</sub> contents (<20%) only in the overburden on top of the profile and at depth below 30 m (see chart, which also shows an average geochemical composition of the kaolin in drill hole 1).

## Resource estimate

The volume of kaolin drilled comprises approximately 80 million tons (including overburden) with a mean Al<sub>2</sub>O<sub>3</sub>-value between 29.5% (spatial interpolation of drill hole data)



Al<sub>2</sub>O<sub>3</sub> content and average chemical composition in drill core from Hassi Abyad kaolin.

and 31.6% (arithmetic mean of analytical results). These figures correspond to mean modal compositions between 75–80% kaolinite, indicating resources of pure kaolinite of around 60–64 million tons.

## Properties and applicability

The Hassi Abyad kaolin is very fine grained with usually >70% in the fraction < 2 µm. Ceramic aptitude tests were carried out on selected Fe-poor samples and showed that the Mauritanian kaolin is principally suitable for the production of diverse ceramic products (sanitary and table ware, wall and floor tiles, technical porcelain) and possibly as a refractory material. The kaolin is characterized by high total shrinkage, typical for kaolinite-rich materials. A use as a filler and/or pigment has not yet been investigated. However, advanced processing methods would be required to reduce the high Fe- and Ti-contents in the average Hassi Abyad kaolin. Elutriation and wet screening tests of such material also revealed low rates of suspension in water and a high thixotropy.

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# Chinese logistics challenges

Chinese mineral producers trying to return to work amid the coronavirus disruptions are being hampered by the continuing shortage of land freight options and restrictions on border crossings.

Almost all land transport movements in China ground to a halt in the weeks following the first outbreak of novel coronavirus. A shortage of lorry drivers and rail freight cars made the transport of cargo within the country and to and from ports almost impossible.

What developed over the few days up to Friday February 14 was a logistics scenario that remained patchy in many areas, while a few provinces were slowly returning to a degree of normal operations.

### Coast versus inland

The first distinction to make is that there seems to be a remarkable difference in the ability of factories, and to some degree of the transport sector, to operate between coastal areas and China's interior. Some provinces on the coast, such as Liaoning in the north, have gradually restarted material movements, with local companies allowed to resume operations. Most magnesia producers in Liaoning reported to Fastmarkets that they have resumed all or part of their production, although some were still closed.

Similarly, in Shandong province, a hub for graphite production, operations in the city of Qingdao gradually restarted after a couple of weeks of closure. The proximity of Shandong's graphite producers to local ports seems to be a main indicator of their ability to resume operations before others that are based further away.

Critically different is the situation in the country's interior. Many of China's inland provinces, including Shanxi, Henan, Hubei, Sichuan, Inner Mongolia and Ganzhou, continue to see significant disruptions to land transport.

At least two sources speaking to Fastmarkets said that authorities imposed an extended period of closures on lorry companies and couriers operating in the provinces of Shanxi and Henan (potentially in nearby areas as well) that would last until the second week of March. What this means is that

Delays to exports of minerals from China are inevitable as a result of the nation's battle to contain the spread of novel coronavirus.

Daide Ghilotti and Carrie Shi made a mid-February assessment of the impacts

very little cargo can be moved on roads in these areas for almost another month.

"The price of transport today, even by train, is up to 1,560 yuan [\$223] per tonne to Tianjin," one seller said. "But road transport is impossible because no trucks are available and [anyway] they do not have permission to drive to Tianjin. Maybe next week it will change; we just don't know."

### Provincial borders shut

Another critical point is that transport between provinces is very limited because authorities want to be sure that they can track the origins of vehicles and contain the movements of people and goods. Consequently, provincial border checks have become much stricter.

"Logistics is very patchy all across China," one local producer of bauxite and alumina said. "Crossing provincial borders is downright impossible now. So, if you are anywhere inland, you can't move material to the ports on the coast."

"We don't expect to be able to ship anything out of our plant until the first or second week of March – there are no couriers available," a second producer, with operations in Shanxi, added. "What this means is that no ships are going to be loaded until March 18 at the earliest."

Rail connections were reported to be working although only on limited routes. The availability of rail cars was also few and far between. "Moving material by train is possible, although limited," the producer said. He added that the lack of lorries to move material to and from rail terminals compounds the problem. "Even if I could get a rail car, I cannot find a truck to take the cargo to the train terminal," he said. "So there you have it."

The first producer offered another example: "Yesterday, a truck wanted to come [to the plant] but could not. It had to get permission to come in, from the police,

and this took more than 10 hours – just for one truck!"

### Late operations and shipments

Operations in many parts of China remain closed at the time of writing. The movement of people continues to be restrained, so workers who left industrial cities to visit their relatives for the Chinese new year celebrations are still, in many cases, unable to return to their places of work.

Those workers who have made it back are not immediately being allowed to return to work. They must spend as long as two weeks with their temperature being checked on a daily basis, to monitor for fever symptoms, before being allowed to resume work. This means that a lack of staff adds to companies' inability to run.

With logistics operations down, feedstock cannot be delivered to factories, nor finished products sent out for delivery to customers, blocking the supply chain at both ends.

Considering that most land logistics are expected to remain under constraint until March, local sources have estimated that delays in sending shipments to destination markets may extend for more than two months in some cases.

"If you reach port in the second half of March, add more than 40 days for the vessel to reach a European port, one week on either end for loading/unloading and clearing, and a few more days to deliver to your customer's plant," one distributor said. "In short, nothing is going to arrive from China into Europe before May – probably the end of May."

One refractories producer in Southern Europe said that he has been given even later estimated times of arrival from his suppliers. "Most of the inquiries I have put out," he said, "now estimate arrival in June or July."

# Indian ferro-chrome trends

## India's ferro-chrome industry faces a range of opportunities and challenges. Kunal Bose reviews the trends

India owns a tiny portion of global reserves of chrome ore but its annual extraction accounts for as much as 11% of world production. Ferro-chrome producers – some of whom have their own mines – note that almost the entire chromite production is consumed within the country for value addition. Following a spate of representations from local alloy makers that a mineral with limited reserves should be preserved for local value addition for as long as possible instead of being exported, the government reintroduced a 30% export duty on all grades of chrome ore and concentrates in May 2016, but over the years Indian government policy on the mineral has flip-flopped.

For a long period, chrome ore exports invited a flat tax of Rs3,000 (£42) a tonne. Then in the national budget for 2012-13, the export levy changed to an *ad valorem* rate of 30%, which virtually completely dried up Indian chromite sales in the world market. Come the 2016-17 budget, in a surprise move New Delhi abolished the duty, having listened to the pleas of miners. They rested their case on the fact that as the duty made chrome ore exports of all grades unviable, inferior-quality mineral, for which there is negligible local demand, continued to pile up at mine sites.

No sooner was this done, however, than the government, as much for revenue considerations as due to pressure from local ferro-chrome producers, reverted to the *ad valorem* system. Chrome alloy producers see this as vindication of the merits of the argument for local value addition. Alloy exports create jobs downstream and fetch a

substantially higher income than the option of selling ore in the world market. Sometimes the miners will, however, mount a campaign for lowering export duty on low grades of chrome ore, but so far they have not been able to get the ear of the government.

An official of government-owned trading house MMTC said: “The stiff duty has made the desired impact of resource conservation. While between 2016-17 and 2018-19, production of chrome ore was up from 3.73 million tonnes to 3.97 million tonnes, exports were down from 230,531 tonnes to 39,273 tonnes. Ore exports during the year to end in March will be around the 2018-19 level. At the same time, imports of high-quality ore were up from 154,000 tonnes in 2016-17 to 162,000 tonnes in 2018-19. The principal sources of Indian imports are South Africa and Oman.”

From a net exporter of chrome ore some years ago, the country has become a net importer, thanks to the 30% duty depriving India ore of its competitiveness in the global market. According to the Indian Bureau of Mines, India's share of global chromium ore reserves of 9.215 billion tonnes is only 102.21 million tonnes. The country's resources needing exploration to be proved as reserves are 242 million tonnes, compared with the world's 12.03 billion tonnes. The Indian Bureau of Mines has placed chromium ore in three categories based on Cr<sub>2</sub>O<sub>3</sub> content: 40%, 40-52%, and 52% and above.

The introduction of the Mines & Minerals (Development & Regulation) Amendment Act, 2015, and subsequently the



**Policies made in New Delhi have a profound influence over India's ferro-chrome industry**

National Mineral Exploration Policy (NMEP), marked a significant change in the mining sector, which so far has not contributed to the country's GDP in line with its potential.

The MMDR Amendment Act, which mandates that auction is the only way to grant mineral concessions, has removed sometimes-abused discretionary powers from the authorities. At the same time, it is a challenge to ensure regular commissioning of blocks of deposits for auction. This is possible only by means of rapid acceleration of exploration.

The NMEP encourages participation of the private sector alongside government agencies. New Delhi wants a “judicious interplay of government support and private innovation and enterprise.” The success that the country is achieving of late in converting resources into reserves in coal, iron ore and bauxite needs repeating for chrome ore.

### Concentration of mines

As 97% of the chrome discovered in India is in the 50 sq km of Orissa's Sukinda Valley, flanked by the Mahagiri and Daitari ranges, it offers logistical advantages for exploration and prospecting of deposits. At the same time, because of the large concentration of open cast chromite mines at Sukinda, and because some miners there are allegedly not using globally accepted environmentally friendly extraction practices, the valley is polluted.

It is a problem that needs the attention of the Orissa government to enforce environmental discipline among those miners who cause pollution. If polluting miners need examples of good practice, Tata Steel, IMFA and a few others stand out as providing examples of how all miners in the area should go about the extraction of chrome ore correctly in the ecologically fragile Sukinda.

All the major chrome-alloy making units owned by groups such as Tata Steel, IMFA, FACOR, Balasore Alloys and Jindal Stainless are in Orissa, which also hosts a significant portion of the country's stainless steel melting capacity of 6.43 million tonnes and annual

production of over 4 million tonnes.

Jindal Stainless Group, which has a mill in Orissa with smelting capacity of 800,000 tonnes, being raised to 1.1 million tonnes, also owns a high-performing stainless steel unit at Hisar in Haryana. For its anti-corrosion and visually appealing properties, and also a favourable strength-to-weight ratio, stainless steel demand in India has grown at a CAGR of 7% in the last six years. Research and consultancy agency CRISIL, however, says that India offers scope for stainless steel demand to grow at an annual rate of 8-9% over the next decade.

### Low use per capita

The minister of state for steel, Fagga Singh Kulaste, said recently that “India’s per capita use of stainless steel has grown since 2010 from 1.2 kg to 2.5 kg.” This is small by comparison with China, where per capita consumption is up from 1.4 kg in 2000 to over 14.5 kg, but China also has more than half the share of global stainless steel output. An industry official said: “Since the demand growth for stainless steel in India is the highest in the world, it is imperative that we continue to pursue the policy of conservation of our chrome ore resource and not at any stage concede the demand of merchant miners for lowering of export duty. While stainless steel contains 18-19% ferro-chrome, this intermediate material too finds application in carbon steel where a good amount of chromium is needed. In the making of ball-bearing steel, tool steel and other alloy steel, use of high-carbon ferro-chrome is required.”

In 2018, India had a share of 3.5 million tonnes of global chrome ore production of 36 million tonnes and 1.4 million tonnes of world chrome alloys output of 13.6 million tonnes. India’s contribution to world production of stainless steel of 51.1 million tonnes was 4 million tonnes.

Any discussion on minerals and metals in India leads inevitably to comparisons with China. The interest centers on how quickly India will be able to build capacity to come closer to its neighbour in the north. A member of the Indian Ferroalloy Producers Association says that China produced 26.6

million tonnes of stainless steel in 2018, overcoming the handicap of its dependence on imports of chrome ore for making chrome alloys. With imported ore, China managed to leave behind South Africa, which is by far the world’s biggest extractor of chromite, to emerge as the globe’s dominant producer of chrome alloys.

Even so, China still needs to import chrome alloys in large quantities. This has benefited India, which raised alloys exports to China by 9.08% to 280,293 tonnes during the year ended March 2019, up from 256,969 tonnes in 2017-18. Domestic requirements being limited, the major part of chrome alloys made in India is exported in large quantities to countries, besides China, such as South Korea, Japan and Taiwan. While 2018-19 saw India’s exports to South Korea taking a major leap of 39.73% to 256,081 tonnes, and to Japan growing 11.66% to 81,313 tonnes, those to Taiwan were down 33.11% to 77,657 tonnes. India’s exports also suffered declines in the US, Mexico and Indonesia.

India’s success in South Korea, China and Japan is largely based on long-term export contracts that leading chrome alloys producers in India have signed with importers, and consistently good after sales service.

Ravi Prakash of the ferroalloys & minerals division of Tata Steel said in a recent conference presentation: “For the most part of the past two years, Chinese ferro-chrome price cycles have mostly been in high ranges. But in recent months, prices have seen sustained weakness.” Chrome alloys producers, including the fully integrated ones with long-term sales contracts with overseas buyers are, therefore, facing a challenging environment.

“China, which is the world’s largest producer of stainless steel, is naturally the biggest user of chrome alloys. That country is the major export destination for us. The outbreak of coronavirus in China and dislocation in industrial production, infrastructure and construction work and trade activities that the killer disease has caused is of major concern to us,” said an industry official.

## ‘Stiff duty has made the desired impact of resource conservation’

### Prospect of shortfall

Demand and prices apart, the prospect of a shortfall in the local supply of ore is now facing Indian chrome alloys manufacturers. This could result from the expiry of three major mine leases in Orissa’s Sukinda Valley at the end of March 2020. Chrome ore production by the three lessees during 2018 was: Tata Steel 1.79 million tonnes, Misri Lal 350,000 tonnes and BC Mohanty 150,000 tonnes. As a result of lease expiry, “nearly 2.3 million tonnes amounting to 7% of global ore supply will possibly be removed from the market for a year or so,” said Prakash.

Ahead of lease expiry, the government has been able to complete the auction of two of the three deposits. Tata Steel has won both by bidding the highest prices. Its own leased asset has yet to be auctioned. Chrome alloys producers are bracing themselves for potential ore supply dislocation for up to a year-and-a-half, such is the lengthy process involved in securing all the clearances before new leaseholders can actually start mining. Some market observers wonder whether New Delhi will exempt chrome ore imports from customs duty of 2.75% in view of the impending shortfall in domestic supply.

A small number of chrome alloys manufacturers such as Tata Steel and IMFA have their own mines and power plants, enabling them to achieve a greater level of cost efficiency than smelters that do not. The Orissa government owned OMC is the country’s largest merchant miner of chrome ore, supplying raw material requirements of alloy producers without mine ownership. In addition to having its own processing plants, Tata Steel also uses the services of some independent standalone ferro-alloy units under business partnership agreements to utilize its surplus chrome ore. The Indian ferro-chrome industry, particularly units with small furnaces and without mine linkages, offers many opportunities for consolidation. The stronger integrated entities remain on the prowl to grow capacity through acquisition.

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# Progress in turning data into knowledge and profitable action

Technology that exploits data collection and analysis to enhance process control, product quality and business outcomes is taking big strides forward. Gregory DL Morris details several recent examples

Early in February, Fastmarkets AMM reported that a collaboration between Big River Steel (BRS) and two partner firms had developed a software application to reduce variability in steel. The mechanical properties variability (MPV) application will be offered on a commercial basis to other steel firms.

Other companies are developing their own artificial intelligence (AI) and machine learning (ML) systems. For example, Primetals Technologies is focusing on extending process control from the melt through the rolling mill and other cold processes.

In the UK, the Advanced Manufacturing Research Centre at the University of Sheffield has added a new analytics firm to its stable of collaborators as part of its effort to push academic research out to industry.

### Collaborative efforts

The development of the MPV was a collaboration involving Big River Steel, SMS group and Noodle.ai. “Big River’s engineering group proposed the project and worked to help design and implement it,” said Denis Hennessey, director of product development at BRS.

David Stickler, chief executive officer at BRS, added, “All [the



BIG RIVER STEEL

parties] involved were introduced via our equity ownership partner, TPG Capital. Noodle is a portfolio company within the TPG Growth Fund. Our management team had been focused on machine learning and big data mining and the Noodle team was clearly like-minded in terms of the potential available to Big River Steel.”

Hennessey explained that “we originally used an SMS-supplied system with the goal of developing our own scheduling app that was

**The collaboration between Big River Steel, SMS group and Noodle.ai is an example of technology, steelmaking and software companies making significant progress with advanced data analytics**

more robust in terms of bringing together procurement, operations, shipping and finance. Achievement of that goal is now in sight, given that we are now using a new scheduling app which was a collaboration of efforts involving the Big River, Noodle and SMS team.

“The new app is handling the scheduling of our mill and interfacing with our other systems,” Hennessey elaborated. “Working together, the three organizations created an

# Technology spotlight: Data analytics

application tailored for steel mills that was designed and built with significant input from the actual people who run the mill.”

The partners are already working on a second release of MPV. “The team at Big River has been integral to each step of the development of the MPV,” said Stickler. “We provided extensive input into how the system was designed and built. The system’s design makes it very transferable to other mills.”

The fundamentals will be the same across all mills, but how the system uses information from a specific mill to establish the link of variables across multiple processing units will be unique to each installation. “We have certainly invested to make sure Big River has first-mover advantage, but our company was founded with the intent to help advance the global steel industry through the sharing of technologies,” Stickler stated. “This is just one of the ways we are living our mission of being a technology company that just happens to make steel.”

## Process control

Steelmakers have been advancing process control since the days of analogue gauges and hand-thrown levers. The MPV application marks an important step change in that evolution, according to Hennessy.

“MPV is able to confirm the main drivers for mechanical properties and give vision into what traditionally have been less than fully controllable parameters,” he said. “As a result our order setups are constantly being refined to help narrow the standard deviation on mechanical properties. Data on chemistry, processing time, temperature, cooling rates, etc. are all being utilized in ways previously not possible to optimize setup from mechanical properties and, as importantly, from cost perspectives. MPV is an advanced tool. It is our enhanced capability to analyze significant amounts of data that we believe provides us with an advantage over other steel producers.”

The company recently formed a venture with U.S. Steel and it is considering several sites for a second mill complex. “U.S. Steel was attracted to Big River Steel’s founding objective of building and operating a technologically advanced mill that combined the best of a mini-mill – low and highly variable cost structure – with the best of an integrated mill – higher product capabilities,” said Stickler.

“Shortly after we began production,” he continued, “U.S. Steel became aware that the steels produced by Big River Steel are in many cases as clean or cleaner than its own steels, and that Big River Steel’s gauge and other tolerances were likewise as tight or tighter. That led U.S. Steel to embrace the ‘Best of Both’ mentality and, after an extensive due diligence effort, to an eventual 49.9% ownership stake in Big River Steel.”

With regard to the location of Big River Steel’s second mill, Stickler noted that “Brownsville, Texas is the leading contender, but other sites in the southern United States are also under consideration.”

## Knowledge into action

As steel industry margins continue to shrink, one way for manufacturers to increase profitability is to pursue more advanced, high-strength steel production for applications such as automotive and electrical. However, production of those advanced steel grades requires much tighter control of the overall production process.

SMS said in a statement that, “the MPV application uses artificial intelligence and machine learning to create a unique ‘sense, predict, and recommend’ framework that addresses challenges associated with the variability of mechanical properties in steel production. The application senses patterns within mill data to understand the drivers of mechanical property variability. It then predicts when increased variability will occur and recommends the optimal input parameters.”

The idea is that the MPV application can help steel manufacturers achieve cost savings three ways: by reducing mechanical properties variability, reducing alloy costs due to better variability control, and minimizing out-of-spec production, which are sold as secondary grades or scrapped.

## Tripod of topics

“We see a tripod of topics for models,” said Kurt Herzog, vice president of Industry 4.0, Primetals Technologies. “The first leg of the tripod is data. That is Industry 4.0. There is information coming from sensors with new technology supporting more data and managing it more easily.

“The second leg is turning data into knowledge. That is the models and data analytics. But knowledge does not yet create value without action. So the third leg is action. For example, we have our sensors on the blast furnace. We have digitized our process understanding as a plant builder by means of rules and expert systems. And these expert systems have supported the blast furnace operator to have standardized actions and always react to certain situations in the same way.”

While software vendors tend to speak in terms of quantum changes, Herzog suggested that development is more incremental. “There are a lot of traditional models in the individual production units. Those are well developed and are mostly good enough. What is not yet well developed is in what we call through-process know-how. That development will help to understand how the chemistry at the melt shop impacts the results at the processing lines, for example.”

At the same time that machine learning is moving downstream from hot processes to cold, there is assimilation and accommodation between data-driven models and first-principles models.

“In data-driven models, you feed the data to machine learning,” said Herzog. “The model learns, then predicts. But those tend to be black-box models. We prefer a

**'The big boom in AI is driven by the amount of data now available, and the computational techniques that had never even been thought of just a few years ago'**

hybrid of data-driven and first-principles models. The latter are based on physics and chemistry. Formulas that any engineer can understand.”

He stressed that “knowledge has to be applied carefully to action. It has to be clear how the system acts and reacts, and how the insights are deployed.”

As an example, Primetals Technology recently developed an information-technology system that collects data and generates a genealogy for each 5- to 10-meter piece in a finished coil. “That data runs from the melt shop through all the production facilities. It is very quick and efficient,” said Herzog.

Ideally such a system catches defects before any shipments get to a customer, and most of the time it does. In any instance that it does not, Herzog noted that “this is learning, human learning and machine learning working together to improve knowledge and inform action. In an instance where a customer asked us to investigate some defects that the system found, we were able to get results from the genealogy within one working day.”

And then take corrective action. “Benefit is generated by action,” Herzog emphasized. “It is not just from generating insight.”

### Understanding deviations

High-level software vendors are taking note of the work that metals companies and their partners are doing. “Everyone is moving to artificial intelligence, machine learning, and advanced analytics,” said Stefan Koch global lead for metals at SAP, a leading supplier of enterprise resource planning (ERP) systems.

“They are looking deeply into quality, going back to the melting process trying to understand why there are deviations in casting, rolling, and even welding. They are taking a very different approach than the traditional mill,” he said.

“The idea is that you can adjust the rules so the error rate gets squeezed. That is how you get better steel. The focus is on the metal, not the machine,” he

## 'Knowledge has to be applied carefully to action. It has to be clear how the system acts and reacts, and how the insights are deployed'

explained. That idea is becoming more powerful with today’s analytical technology, he added.

SAP is heavily involved in AI, ML, and even robotics across multiple industries. “Our customers use our technology stack for many purposes. We have seen that in many cases,” said Koch. “We try to embed the technology into the business process, starting with the financials.”

SAP has advanced applications for customers in Asia that were started in financials and were then extended to quality, human resources, and maintenance. “Severstal in Russia is one of the most innovative customers we have in this area. They are a huge company with 50,000 employees,” and they use SAP applications in many ways.

One important application for AI is to manage spare parts. “There can be thousands of them,” said Koch, “and each one has to be identified and tracked. AI is used to keep current with upgrades as well.”

S4 Hana is the core ERP system for SAP. The company’s umbrella Internet of Things system is called Leonardo. That comprises AI, ML, and blockchain in an analytic cloud. “It can all be blended so there is not one specific application,” said Koch.

“There are lots of companies pushing into data. We will all meet at the final destination.”

### Advanced analytics

Analytics and software company SAS recently became a tier-one partner at the University of Sheffield Advanced Manufacturing Research Centre (AMRC) in the UK. Under the partnership, the two will identify specific areas in manufacturing in which to apply methods and principles of advanced analytics.

“Sheffield is very much the steel city of the UK,” said Jake Senior, digital software engineer at AMRC. “That is not as much today as it used to be, but there are still forges putting out high-quality steel.”

AMRC tends to concentrate on industries with high value and low

volume, such as aerospace and automotive. “We have the largest ceramic shell casting facility in Europe,” said Senior. “Our research is available to our industry partners, and we are a member of lots of consortia in different industries. Beyond that, any company can come to us for a specific project.” If a company funds the research, then it owns the intellectual property.

“Manufacturers are very risk averse, so we fit between them and academic research,” said Senior. “Our remit is to help push innovation to industry.” That extends to AI, ML, and beyond to natural-language processing and computer vision. “We are trying to recreate aspects of biology in a computational system,” he added. “That will make computers more intuitive in interaction.”

“We have years and years of data,” said Senior. “SAS are good partners because they have a broad platform,” he added.

Many commercial operations are vexed by systems integration. “One company may have three different systems, each with its own architecture,” said Senior. “The challenge is to get the data out of those systems and something digested into analytics.”

For steel, Senior said “it is possible to pull a lot of insight out of simple sensors and a computer.” He noted the “big boom in AI is driven by the amount of data now available, and the computational techniques that had never even been thought of just a few years ago.”

He explained that for process industries like steel, AI is an important departure. “Traditional monitoring and control systems were built around set points. The objective is to maintain the process within certain parameters.”

If there is an excursion, the system tries to bring the process back within the parameters. The difference with AI is that the system learns why there was an excursion, so it can take steps all along the process to try to prevent excursions.

# New plant orders and technologies

A list of recently placed international new plant orders – announced for new and upgraded plants, expansions, modernizations and revamps – provides many examples of the application of the latest innovative technologies available from a range of leading suppliers

Customer	Supplier	Order Details	Start Up
<b>Cambodia</b>			
Renaissance Minerals (Cambodia)	Outotec	HIGmill® high-intensity grinding mill, a semi-autogenous (SAG) mill, TankCell® flotation cells, OKTOP® conditioner, thickeners and spare parts for Okvau Gold Project	Q2 2021
<b>Canada</b>			
Algoma Steel	Danieli	Upgrade of 166in wide plate mill in Sault Ste. Marie, Ontario, to enable wider plate production, better shape control, surface quality and logistics	Summer 2021
ArcelorMittal Dofasco	SMS group	Replacement 320 ton KOBM converter and gear drive for steelmaking plant in Hamilton, Ontario	Q2 2021
<b>China</b>			
Baosteel	Danieli	New bar peeling machine at Baoshan plant for large-diameter bars up to 200 mm dia	March 2020
Chengde Jianlong	Danieli	New five-strand bloom caster for 240 mm squares and 210 and 400 mm rounds in SBQ grades, using Q-EMS dynamic final-stirring system	–
Hebei Steel Group	Danieli	Twin-shaft scrap pre-shredder for Shigang Steel Mill. Mouth width of 2.2 meters and installed power of 600 kW for 30 tph capacity, expandable to over 60 tph	Mid-2020
Henan Jiyuan	Danieli	Two new grinders to process 150 mm square special steel billets up to 12 meters long in full skin and spot/pattern grinding modes for 70,000–90,000 tpy output	Early 2021
Hegang Laoting	Danieli	Three subblance systems with SDM Process Model and ASCON slag control system from Danieli Corus for the 120-ton converters of BOF Shop No. 2 in the Laoting Economic Development Area, Hebei province	–
Sichuan Derun I&S Group Hangda Steel	Danieli	New mill to roll rebar products of 12–40 mm dia at rates up to 240 tph, starting from 170 mm billets weighing up to 2,600 kg	August 2020
Tangshan Reafon Iron & Steel	Danieli	Subblance-based BOF process control system with SDM process model from Danieli Corus for a 210 ton converter at Tangshan, Hebei province, plant	–
Xiangtan Iron & Steel	Paul Wurth	SOPRECO® single oven pressure control systems for two top charging coke oven batteries as part of new coke making plant. Each battery has 50 coke ovens with a height of 7.3 meters, equipped with the technology for individual oven pressure control and coke oven battery emission control	End-2020



Chalco Ruimin Co., Ltd, part of Chinalco, has signed the final acceptance certificates for a continuous annealing line and a chemical pre-treatment line for processing aluminium strip coils supplied by Tenova. The two new lines at the new plant – located in the Fuzhou Economic Technical Development Area on China's South Eastern Coast – process automotive and aerospace industry grade aluminium alloys (series 5xxx, 6xxx and 7xxx), with strip width ranging from 1,000 up to 2,200 mm and thickness ranging from 0.5 up to 4 mm. The total production rate for the continuous annealing line is 100,000 tons/year with a process speed of 80 meters per minute. The chemical line's production rate is 120,000 tpy, with a process speed of 60 meters per minute.



Chengde Jianlong has contracted Danieli to supply a new, five-strand bloom caster to be installed at their Chengde plant, Hebei Province, China. This will be the second Danieli caster for long products at that location – a CCM for large rounds was installed by the same plantmaker in late 2011. The new, five-strand 12-meter radius caster, which is designed to cast 240 mm squares and 210 and 400 mm rounds in SBQ grades, will make use of Danieli's Q-EMS technology to achieve top-quality blooms on all grades. Through the Liquid Pool Control (LPC) system supplied by Danieli Automation, along with the process control system, the caster will be able to position the final stirrer along the radius automatically, while regulating current/frequency for the highest internal quality.

Customer	Supplier	Order details	Start-up
Xinjiang Amer Qian Golding Cable	SMS group	CR-3500 Contirod® plant for copper wire. The wire rod line is designed to produce up to 35 tons of ETP copper wire per hour (225,000 tpy)	Q2 2021
Youli	Danieli	New Danieli Fata Hunter twin roll casting technology for magnesium alloy sheet complex in Shandong, China, to produce hot-rolled coils for strip 4-7 mm thick, from 900 to 1,425 mm wide.	-
Yunnan Qujing Cheng-gang Steel Products	Danieli	New 1.2 Mtpy two-strand bar mill to produce 8-40 mm dia rebar and round bar, for grades HRBF 400E - 500E, produced at rates of up to 200 tph, starting with 165 mm billet with a weight of 2.5 tonnes	-
<b>Czech Republic</b>			
Trinecke Zelezarny	Paul Wurth	Blast furnace No.6 hearth reline	Reline starts in 2021
<b>France</b>			
Ascoval	Danieli	Expand product capability for special steel caster at Saint Saulve to include production of square billets from 150 to 240 mm and rectangular blooms of 300 x 365 mm. Installation of Danieli Rotelec final electromagnetic stirrers and product handling for slow cooling to expand range of steel grades	August 2020
<b>Germany</b>			
Constellium Singen	SMS group	A 45 MN extrusion press to increase production of high-quality aluminium profiles and to respond to growing demand from the automotive industry	Summer 2020
Otto Fuchs	SMS group	One Ecomelt-PS150 7.7 tph scrap-melting furnace and two tiltable holding and casting furnaces with a capacity of 20 tons from Hertwich Engineering for the Meinerzhagen casthouse	-
ROGESA Rohei-sengesellschaft Saar mbH	Paul Wurth	Coke oven gas injection systems for BF Nos. 4 and 5 in Dillingen/Saar	Starts in summer 2020
<b>India</b>			
Sunflag Iron & Steel	Danieli	Complete process automation, instrumentation, drives, and motors for new 320,000 tpy SBQ mill in Bhandara, Maharashtra, for 45-120 mm dia bar	-
<b>Japan</b>			
Nippon Steel Corporation	Tenova	Consteel® EAF for Hirohata works	H1 FY2022
Yamato Steel	SMS group	TBK Automatisierung und Messtechnik PROgauge light-section laser measuring system for Kokyo section mill to measure medium and heavy sections, including H-beams and channels	December 2020
<b>Russia</b>			
Evrz Consolidated West-Siberian Metallurgical Plant JSC	Danieli	QSP-DUE (Danieli Universal Endless) plant for the production of high-value-added products for new facility in Novokuznetsk, Kemerovo Region, Russia. Total capacity of 2,500,000 tpy of HRC for strip from 0.80 to 16.0 mm thick and 950-1,700 mm wide. Thin-slab caster with a 5.5 meter main radius for a slab thickness from 100-123 mm, with a maximum casting speed of 6 m/min. Twin-station ladle furnace (310 t) and twin-tank vacuum degasser (310 t).	-
NLMK	Tenova	New 450,000 tpy hot dip galvanizing line for coating material including interstitial free (IF) steel, high-strength steel (HSS) and advanced HSS	-
Pervouralsk pipe plant	Tenova	New Tenova LOI Thermprocess roller hearth continuous furnace system for bright annealing stainless steel pipes in a 100% hydrogen atmosphere. Designed for 2,000 kg/h of austenitic stainless steel and nickel-based alloy pipes	-



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# Metals technologies

Customer	Supplier	Order details	Start-up
Severstal	Danieli	Three sub-lance systems from Danieli Corus for three 350t converters at the BOF shop at Cherepovets	–
<b>South Korea</b>			
Hyundai Steel	Andritz	New Andritz SELAS direct-fired furnace for existing CGL at Hyundai's Dangjin plant to assist production of value-added products for the automotive market	Q4 2020
<b>Spain</b>			
ArcelorMittal Asturias	SMS group	Replacement of old coke-oven gas burners by SMS EcoFlame(PLUS) burners for walking beam furnaces 2N, 3N and 4N in the Aviles hot strip mill to enable BOF gas consumption	–
Celsa Barcelona	SMS group	Modernization of 1-million-tpy medium-section mill to include new, higher capacity cooling bed and compact roller straightener (CRS®) upgrade	Summer 2020/2021
<b>Taiwan</b>			
Celsa Barcelona	SMS group	Revamp of 1 million tpy section mill in Castellbisbal to replace existing cooling bed with a higher capacity one and to upgrade the compact roller straightener (CRS®) for heavier products	Summer 2020 for straightener; summer 2021 for cooling bed
China Steel Corporation	SMS group	Revamp of the oldest RH units at Steelworks No. 1 in Kaohsiung with a new four-stage steam jet vacuum pump, for hydrogen degassing in the production of high-grade heavy plate	2020
China Steel Machinery Company	Primetals Technologies	Cast-iron staves for China Steel Corporation's 3,300 cu meter (6,900 tpd) BF No.2 at the Kaohsiung plant for a rebuild aimed at extending the furnace's life-time by 18 years	Early 2021
<b>USA</b>			
Constellium Rolled Products Ravenswood	SMS group	Modernization of 112in finishing mill exit end of aluminium hot strip mill. Two constant passline coilers to be replaced by a single fixed-position coiler	–
Hydro Extrusion North America	Danieli	New Danieli Breda 60 MN front-loading direct extrusion press in Phoenix, Arizona	–
North Star Bluescope Steel	Danieli	New meltshop to include single-bucket charge, 195-short-ton EAF, two LMFs and pulse-jet fume treatment plant with fume quenching technology	End-2021
North Star Bluescope Steel	Danieli	Two Danieli Centro EOT charging cranes with lifting capacity of 310(430)/100/25 short tons to Delta, Ohio, works where Danieli is supplying a meltshop project including EAF and LF furnaces and fume treatment plant (see entry above)	July/October 2020
Nucor	SMS group	Single-strand 1.45 million tpy (1.6 million stpy) slab caster in Brandenburg, Kentucky, for 8-12in thick slab up to 124in wide and 104-600in long	–
Nucor	Danieli	New 4-strand caster with Fast Cast Cube oscillator and Hy-Power actuator for Kankakee plant to produce commercial, low-carbon, peritectic and medium-carbon grades. Plus a secondary metallurgy station with automatic stirring lance.	–
Steel Dynamics	Fives	DMS SkinPass 4Hi skin-pass mill for GalvTech facility in Pittsburgh, Pennsylvania	–
Steel Dynamics	Andritz	Direct fired furnace, differential rapid jet cooling and after pot coolers for CGL No.1 at the Columbus, Mississippi, plant to produce AHSS for the automotive industry	Q4 2020
<b>Vietnam</b>			
Hoa Phat Dung Quat Steel	Danieli	A 1,400 t shearing force scrap shear for the Quang Ngai iron & steel complex	April 2020



Taiwanese steel producer China Steel Corporation (CSC) has awarded SMS Mevac an order to revamp the oldest of the RH units (Ruhrstahl Heraeus) at its No. 1 steel works in Kaohsiung. SMS Mevac will equip the RH unit with a new four-stage steam jet vacuum pump. In 1982, the No. 1 RH facility (160 tons) was commissioned by a company which is now part of SMS group and, in 1990, SMS Mevac modernized it in just 73 days. CSC uses the facility for hydrogen degassing in the production of high-grade heavy plate.

SMS group's scope of supply for the new order includes the design of the layout, the engineering, manufacturing and supply of equipment, and commissioning, which will take place this year. Owing to the increased extraction capacity of the new pump (600 kg per hour at 0.67 mbar), it will be easier to compensate system leakages and evacuation times will be shorter. Additionally, the new vacuum pump can be operated at condenser cooling-water temperatures of up to 38°C boosting the flexibility of the RH unit, especially during the hot summer months.

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## Thyssenkrupp Steel digitizes order scheduling for its Duisburg rail operations

Thyssenkrupp Steel has successfully implemented an app-based initiative that enables better communication between order schedulers and drivers on its 300 km long railway network for transporting raw materials and products within and beyond its site in Duisburg, Germany.

Previously, communication was mainly achieved via radio, but the system was relatively complicated and time-consuming.

“To change this we set up an interdisciplinary team,” said Michael Heise, senior engineer from Logistics at Thyssenkrupp Steel. “Our goal was to create a digital means of

recording work orders without the need for communication between scheduler and engine driver.”

Exchanges between the scheduler and engine driver now take place almost exclusively via the newly developed app, making many conversations via radio unnecessary.

The new app marks a strategic drive towards Thyssenkrupp’s digital transformation to improve production performance, security and integrate value chains within the company.

The underlying cloud-based system architecture developed by the team for this app will also be available and used by future apps.



**Thyssenkrupp Steel's Duisburg rail network now uses an app-based system**

## UK-based Gigastack industrial-scale hydrogen project makes strides

Gigastack, a UK-based initiative to advance industrial-scale hydrogen production using renewable energy, will advance to its next phase with £7.5 million (\$9.9 million) of funding from the Department for Business, Energy and Industrial Strategy.

Making hydrogen from renewable electricity could enable energy-intensive industries to reduce their carbon footprint. In a completely decarbonized process, the electricity is used to generate hydrogen via the electrolysis of water. An offshore wind farm is one possible source of power.

The Gigastack project is led by ITM Power, Ørsted, Phillips 66 Limited and Element Energy. In a feasibility study completed in 2019, ITM Power developed designs for a low-cost modular 5 MW electrolyser stack and collaborated with Ørsted to understand the potential synergies with offshore wind farms, and with Element Energy to undertake a market analysis and explore business models for the first industrial-scale 100 MW electrolysers.

For the second phase of the project, the consortium will conduct a Front-End Engineering



Design (“FEED”) study on a 100 MW electrolyser system using staged installations with a nominal capacity of 20 MW. The study will detail the actual design of a hydrogen production system connected to a wind farm and industrial off-taker using ITM Power’s new generation of electrolyser stack technology, renewable energy directly from Ørsted’s Hornsea Two offshore wind farm, and with the resulting renewable hydrogen supplied to an industrial off-taker – Phillips 66 Limited’s Humber Refinery.

ITM Power will also install and trial both their next-generation electrolyser stack and the semi-automated manufacturing machines required for large-scale and high-volume manufacture of the stacks.

**The use by industry of bulk, low-cost zero-carbon hydrogen from renewable energy is under study**

## Posco moves forward with UWB tracking

South Korea’s Posco has teamed with two technology firms to develop a precision location tag with ultra wide-band (UWB) radio technology and integrated wireless charging. This could bring greater efficiency and safety to its steel factories.

PiBEX, an R&D subsidiary of Posco, has developed, alongside California-based Energos Corporation and business solutions provider SK Telesys, a location tracker to be used for security and staff safety within Posco’s manufacturing sites.

Energos has moved further into industrial markets – and into others markets such as hearing aids – with its WattUp®RF wireless charging 2.0 technology.

## Winners of SMS group data challenge

How can machine-learning algorithms help to make steel production more efficient was the question that students from the University of Duisburg-Essen were tasked with in a data challenge competition with other universities.

SMS group gave several universities a task to develop an algorithm that could spot defects during the steel production process, based on the raw material used, throughout the entire production process, and particularly in the casting of steel in a continuous casting plant.

Chen Shikun and Mohammad Armoun from the University of Duisburg-Essen won first prize of €15,000 (\$16,000). SMS group reported that the defect predictions made by all of the final teams were almost 100% correct, but the winning team impressed the jury with its solution.

## Umicore and Audi progress EV cobalt/nickel battery recycling R&D

Umicore and Audi Group have completed phase one of their high-voltage battery recycling research, which could mean that the majority of the cobalt and nickel in their fully electric car battery materials will be recoverable and used in new battery cells.

The recycling of raw materials is an important move forward in technology to conserve resources and can reduce carbon-dioxide emissions. The first test of the project recovered 90% of the cobalt and nickel from the Audi e-tron batteries.

In January 2020 the team embarked on the second phase of the pilot project to use the recovered material in new battery cells. In their cooperation on the closed-loop project, the companies will take cell modules from the Audi e-tron, initially from development vehicles, to process into precursor and cathode material.

“Umicore is committed to enabling the transition to electrified mobility. Innovative technologies, responsible sourcing and closing the materials loop will lead the drive towards clean



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mobility. This project with Audi is at the forefront of the development of a sustainable value chain for electrified transport,” Marc Grynberg, chief executive officer of Umicore, said.

Audi has from the beginning researched the recyclability of its fully electric cars. “It is our aim to think sustainability holistically. This includes dealing with the remaining ‘end of life’ as well as resource-saving development of our products,” Bernd Martens, member of the board of management for procurement and IT at Audi, said.

**Umicore and Audi Group have moved to phase two of a project to recycle the majority of cobalt and nickel in EV battery materials**

## Norway's Kongsberg leads the way in next generation autonomous shipping

Kongsberg, a maritime systems provider, will install and test two autonomous ships for use in two varying operational environments – short sea coastal waters and inland European waterways. The move could provide a roadmap for commercializing autonomous shipping in Europe, noted Kongsberg.

Funded by nearly NOK200 million (€22 million) from the EU Horizon 2020 program, the two vessels – *Eidsvaag Pioneer*, owned by Eidsvaag shipping company, and a Belgian pallet shuttle barge, owned by Blue Line Logistics NV – will test autonomous navigation systems.

Norwegian research company SINTEF and other partners will collaborate on Autoship, the four-year Horizon 2020 project, along with support from the Research Council of Norway.

“The Norwegian maritime cluster, of which Kongsberg is a part, is the world leader in autonomous shipping. Now we are further strengthening our position through the Autoship project, which will accelerate the realization of next-generation autonomous ships and create a roadmap for commercializing autonomous shipping in the EU in the next five years,” Egil Haugsdal, CEO of Kongsberg Maritime, said.



KONGSBERG MARITIME

**The Norwegian minister for Research and Higher Education, Iselin Nybø, is briefed by Johnny Stene, Captain on Eidsvaag Pioneer**

## Century Aluminum offers new low-carbon portfolio

Century Aluminum Company has launched Natur-Al™ low-carbon aluminium products. Natur-Al aluminium products are made at the company's Nordural, Grundartangi, Iceland smelter.

The portfolio will use energy from 100% renewable sources, while achieving carbon dioxide levels at 4 tonnes carbon dioxide per tonne of aluminium, said the company.

It comes in standard ingots sizes of 20-22 kg, offered in primary grades P0610, P1015, P1020 and primary foundry alloy grade A356.

The CO<sub>2</sub> emissions are verified by The Aluminium Stewardship Initiative (ASI) for responsible production, sourcing and stewardship of aluminium, an independent third-party that facilitates life-cycle assessments for Century customers.

Natur-Al Zero is the company's fully offset, pure, carbon-neutral aluminium product line.

“We are very proud to introduce the Natur-Al line of low-carbon aluminium. Century Aluminum is committed to work with its customers towards more sustainable and lower carbon products and respond to increased customer demand for responsible aluminium production. Natur-Al™ enables our customers to significantly reduce or fully offset the carbon footprint of their products,” Ágúst Hafberg, chief executive officer at Century Aluminum, said.

Century aims to gain an edge in the competitive markets of consumer goods, vehicles, packaging and construction material.



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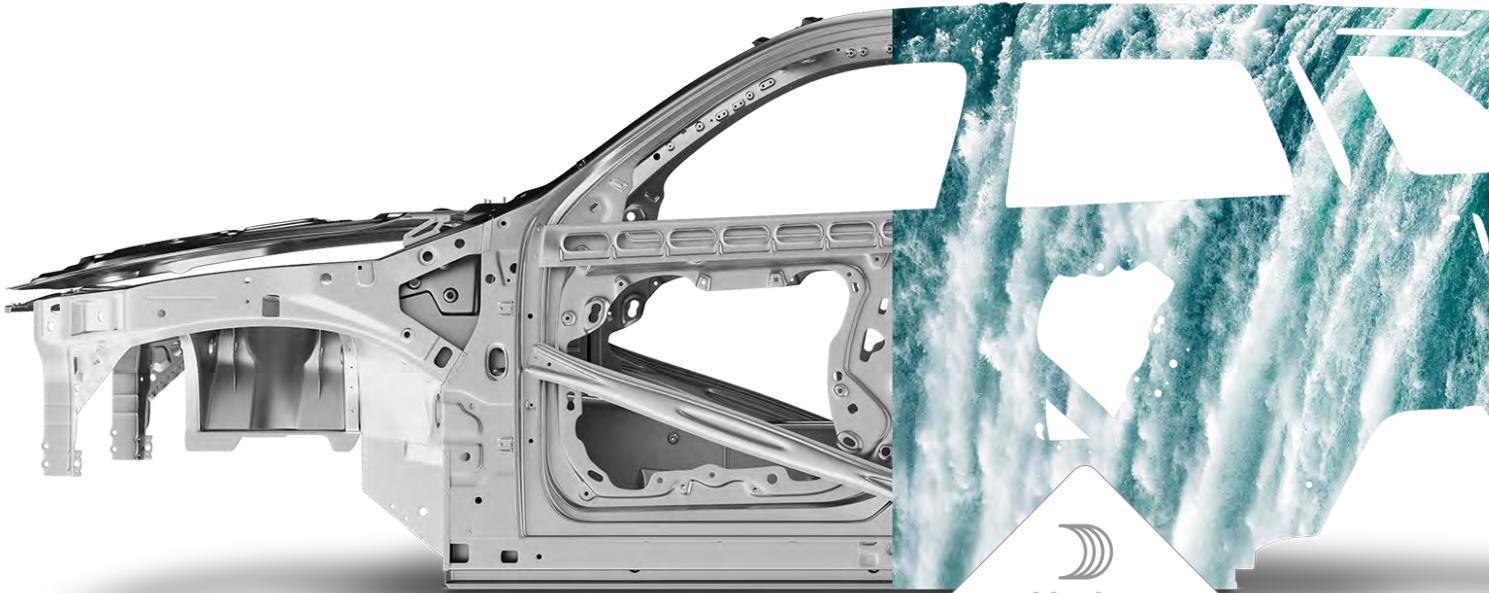
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