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REEL Aluminium delivers innovative engineering solutions and end-to-end support for the aluminium and industrial sectors, driving performance across global industry. With a strong international presence and 80 years of proven expertise, we design, supply, and maintain advanced systems and technologies that enhance efficiency, reliability, and sustainability. Committed to innovation and green progress, we support the industry's transition towards a net-zero future, delivering performance that lasts.

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Aluminium Company Of Malaysia Berhad
196001000186 (3858-U)

+60 3 3346 6262 +60 3 3341 2793

No. 3 Persiaran Waja, Bukit Raja Industrial Estate
41050 Klang, Selangor, Malaysia.

https://alcom.com.my/ marketing@alcom.com.my

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Editorial

Debanjali Sengupta
Deputy Manager - Content

Dear Readers,

In the current landscape, the global aluminium industry finds itself at a critical juncture and seeks clarity on some of the most pressing challenges the industry has ever encountered. Where are the aluminium prices headed? How will the growing demand be served amid disrupted supply chains? Will the recycled metal be capable of filling in the gap? Will the decarbonisation journey reach its goal within the timeline, and so much more?

To delve into these queries, AL Circle has brought its annual flagship e-Magazine "ALuminium LeaderSpeak 2026." This is the eighth edition, and with each passing year, this e-Magazine seems more like a symbolic publication than just an annual ritual. And why not, after all, aluminium – the metal itself is growing as a strategic raw material for value-added industries. From electric vehicles to renewables, aerospace and defence to building & construction, and packaging to electrical & electronics, aluminium is found in all those industrial sectors that play a critical and crucial role in shaping the economy and regional infrastructure.

We talk about challenges as well as solutions
If the world aluminium industry is celebrating its demand growth, it is also navigating some real challenges, like crippled supply chains. With China about to touch its 45-million-tonne production cap, Europe grappling with elevated energy costs and therefore subdued output, and the United States focused on tariffs and policy, the global supply chain of the green metal is now a question among industry buyers and consumers.

Travelling slightly to a year ago, this was the time in 2025 when primary aluminium producers in countries like Canada, India, and the United Arab Emirates were looking for alternative export destinations since the United States had imposed a staggering 50 per cent tariffs on imports. Cut to the same period in 2026, buyers are seeking alternative sources for the metal due to the geopolitical crisis in Gulf countries and Hormuz blockage. In between, prices soared, and so the premiums; energy costs remained volatile; and demand took no U-turn.

Solutions? Well, many consumers resorted to aluminium scrap as an alternative raw material, resulting in 28 per cent of 100.8-million-tonne demand met through scrap, began incorporating renewables in the energy mix, embraced technology and automation to optimise production efficiency, and implemented policies to safeguard domestic resources. Europe, in particular, took a lead in the last move by being loud and clear about standing firm on trade and supporting products "Made in Europe". Following the suit, Canada has adopted a "Canada First" approach too to its aluminium sector, focusing on protecting domestic producers and strengthening North American supply chains. **Paul**

Voss from European Aluminium and **Jean Simard from the Aluminium Association of Canada** have shared their thoughts on the evolving regional policies as well as on the current supply chain scenario in restricted transnational movements.

As technology has taken centre stage in driving operational efficiency and production scale, this edition brings together the world's leading solution providers, such as **Rodabell, REEL, T T Tomorrow, Epiq Machinery**, among others, to explore their key contributions and the role they have played in shaping the industry into what it is today, technically. Adding a user-side perspective, Dr Joseph Nierling from **Porsche Consulting**, has offered strategic insights into the adoption of AI and digitalisation, outlining how these technologies can be effectively integrated to enhance operational performance and long-term competitiveness.

Since decarbonisation is a critical industry objective, we have forward-looking thoughts from the Aluminium Stewardship Initiative, which says meaningful progress will depend on collective action, cross-industry collaboration, and coordinated efforts to navigate the challenges of today's evolving landscape.

On top of all these, what is keeping the industry on edge is the volatile price movement. And this is not a recent occurrence. For over a year now, with the implementation of US tariffs, primary aluminium prices have been reacting strongly to the demand-supply gap, reaching above USD 3,500 per tonne at present. UBC aluminium scrap prices are neither lagging behind, but growing at a record speed, standing at more than USD 2,500 per tonne. What does it mean? Aluminium scrap demand is rising, and supply is yet to catch up. The rest is well explained by **Matthew Chamberlain from the London Metal Exchange** in his interview.

ALuminium LeaderSpeak 2026 in brief

ALuminium LeaderSpeak 2026 is a carefully curated magazine that brings together insights from key decision-makers, policy-makers, and innovators. This edition mindfully captures perspectives and expert views on price trends, decarbonisation, and evolving technologies, in an attempt to deliver the present and future prospects of the aluminium industry.

For a clear view of what lies ahead in 2026 and beyond, this edition serves as a strategic lens through the voices of industry path bearers.

Editorial Desk

Aranya Mondal (amondal@alcircle.com),

Pratyusha Chatterjee (pchatterjee@alcircle.com),

Nilanjana Banerjee (nilanjana@alcircle.com),

Ishita Ganguly (ishitag@alcircle.com),

Debanjali Sengupta (dsengupta@alcircle.com)

Production

Snehasish Sahoo (snehasish@alcircle.com),

Swarup Chaki (sc@alcircle.com)

Bruce Roger Wilson
Director, Aluminium Division - REEL International

Redefining industrial performance in aluminium through engineering and digital integration

Currently leading REEL International's Aluminium Division, Bruce Roger Wilson steers global projects with a clear emphasis on efficiency, reliability, and long-term industrial value.

With over 27 years of experience in the primary aluminium industry, he brings a strong combination of technical expertise and strategic insight. Holding a degree in mechanical engineering, an MBA, and project management certification, his profile reflects a balance between engineering depth and business leadership.

Throughout his career, Bruce has worked with leading global organisations, delivering complex, multidisciplinary projects across both greenfield and brownfield aluminium smelter developments. His experience spans technical execution, commercial understanding, and operational leadership, with a proven ability to meet high technical, contractual, and managerial standards.

Recognised for a practical and results-driven leadership style, he is known for building high-performing teams while driving innovation, collaboration, and continuous improvement across the organisation.

AL Circle: As REEL International built a strong presence across multiple regions and industrial sectors, including aluminium, aerospace, nuclear energy and offshore engineering, what are the company's key strategic priorities today, and which regions or markets do you expect to drive the next phase of growth?

Bruce Roger Wilson: Our strategic priority today is to help industrial clients modernise critical operations in a way that improves safety, performance, reliability and sustainability at the same time. Across all our sectors, we are focused on combining strong engineering fundamentals with greater digital capability, smarter automation and long-term service support.

A second priority is selective growth in markets where industrial investment remains strong and where our expertise in complex, safety-critical equipment gives us a clear advantage. For REEL Aluminium in particular, this means supporting both greenfield and brownfield developments, as well as smelter modernisation programmes aimed at improving safety, production, equipment uptime, reducing emissions and increasing operational flexibility.

From a regional perspective, the Middle East and India remain highly important, particularly because of their concentration of major aluminium producers and ongoing industrial ambitions. We also continue to see strong opportunities in Europe and North America, with the potential of a few greenfield smelters. There is also a focus on existing smelters where decarbonisation, ageing infrastructure and industrial sovereignty are driving investment. More broadly, regions that are investing in resilient supply chains, strategic materials, advanced manufacturing and energy transition infrastructure are likely to shape the next phase of growth.

AL Circle: Industrial facilities such as robotic palletising stations for aluminium ingots or robotic drilling systems are becoming increasingly automated and digitally connected. How is REEL evolving its engineering and technology capabilities, particularly in areas such as automation, robotics and smart plant operations, to support the next generation of industrial infrastructure?

Bruce Roger Wilson: We see automation, robotics and digital integration as a natural extension of engineered design rather than a separate layer added afterwards. At REEL, the objective is not automation for its own sake, but automation that improves safety, repeatability, maintenance planning, traceability and operational decision-making.

To support this, we are continuing to strengthen our capabilities in advanced controls, robotic handling, intelligent machine supervision, remote diagnostics and data integration between equipment and plant-level systems. In practice, this means designing equipment that can operate more autonomously, provide better operating data, and interact more effectively with wider plant systems.

For clients, the value is clear. More intelligent equipment can reduce manual intervention in hazardous environments, improve consistency, shorten maintenance cycles and support predictive approaches to asset management. In order to support the next generation of industrial infrastructure, the REEL equipment will depend on closer interaction between mechanical engineering, automation, software and real-time operational data.

AL Circle: How do you see digitalisation reshaping plant design and operations in sectors such as aluminium, nuclear energy and offshore engineering?

Bruce Roger Wilson: Digitalisation is changing both how plants are designed and how they are operated over their lifecycle. In design, it allows for better simulation, more integrated engineering, improved scenario planning and stronger alignment between the process, the equipment, maintenance and operational requirements from the outset.

In operations, digitalisation is enabling greater visibility. Operators can monitor performance more accurately, anticipate issues earlier and make better-informed

decisions. This is especially important in sectors such as aluminium, nuclear and offshore, where safety, reliability, and uptime are absolutely critical.

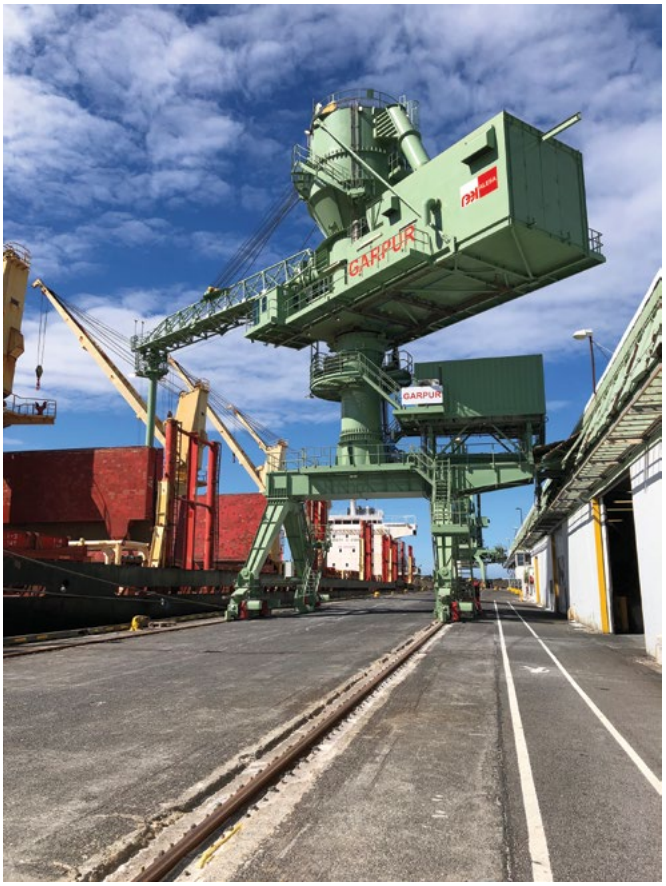
What is important, however, is to remain practical. Digitalisation must solve real operational problems. The most successful applications are those that help reduce downtime, improve maintenance efficiency, strengthen safety controls, optimise energy use and increase process stability. In that sense, digitalisation is becoming a core enabler of industrial performance, but it must always remain grounded in plant realities.

AL Circle: How can engineering companies like REEL contribute to modernising smelters and improving efficiency driven by decarbonisation, energy efficiency and process optimisation across the aluminium value chain?

Bruce Roger Wilson: In an aluminium smelter, for a total electricity consumption of about 14,000 kWh/t Al (world average), approximately 94 per cent is directly associated with the electrolysis process, with the remainder consumed by ancillary systems and facilities. In recent years, substantial progress has been achieved in reducing the electricity demand of the electrolysis process. By contrast, the consumption associated with ancillary systems has remained roughly unchanged.

Although their share is relatively small, ancillaries still represent a significant absolute contribution – close to 1 t CO_2/t Al for smelters supplied by coalfired power plants – and therefore constitute a meaningful lever for carbon footprint reduction. One of the largest single electricity users outside the reduction process is the Gas Treatment Centre (GTC), which treats pot off-gases and typically accounts for up to 30 per cent of ancillary power consumption. It is therefore a prime candidate for any electricity reduction strategy. Within the GTC, most of the energy is consumed by the large exhaust fans located downstream of the filters, which provide the suction required for effective pot gas capture. Several opportunities exist to optimise the energy consumption associated with pot gas collection and treatment.

Engineering companies have a very important role to



play because smelter modernisation is rarely about one isolated technology. It is about improving the interaction between equipment, process, emissions control, material handling, automation and long-term operability.

At REEL, we contribute by helping clients modernise critical areas of the plant in a way that delivers measurable operational benefits. That can include improving pot tending performance, upgrading anode handling and rodding systems, optimising bath and metal handling, modernising material conveying and storage, and enhancing gas treatment and environmental control systems.

Decarbonisation and efficiency are closely linked. Better-engineered systems can reduce energy losses, improve process consistency, limit fugitive emissions, reduce unplanned stoppages and extend equipment life. For many smelters, the path forward will be a phased one, where targeted upgrades and digital improvements gradually build a cleaner, more efficient and more resilient operation.

AL Circle: Geopolitical tensions, trade disruptions and shifting alliances are increasingly shaping global supply chains and investment decisions. How are these developments influencing the industries REEL works with, and what strategies should companies adopt to build more resilient supply chains?

Bruce Roger Wilson: These developments are already having a significant impact. Our industries are seeing increased focus on regionalisation, supplier diversification, local industrial capability and reduced dependence on overly concentrated supply chains. Clients are understandably looking more closely at pricing structures, security of supply, lead times, critical spares, project execution risk and the resilience of logistics networks.

For engineering companies and industrial operators, resilience starts with visibility and preparedness. At REEL, we strive to avoid overreliance on single-source supply, strengthen relationships with strategic partners, localise where it makes sense, and build greater flexibility into procurement and project planning. It is also increasingly important for REEL to design equipment with maintainability, spare part accessibility and upgradeability in mind.

In today's environment, resilience is not only about cost. At REEL, resilience is about continuity, adaptability and long-term strategic visibility.

AL Circle: Energy-intensive sectors such as aluminium are under pressure to reduce emissions while maintaining competitiveness. What role can engineering and automation solutions play in helping industries address environmental challenges and move toward more sustainable operations?

Bruce Roger Wilson: Engineering and automation solutions are central to this transition because they allow plants to improve environmental performance while protecting operational stability and competitiveness. That balance is essential.

In practical terms, better equipment design can reduce waste, improve energy efficiency and support tighter process control. Automation can help stabilise operations, minimise variability, reduce unnecessary consumption and improve performance monitoring. Environmental control technologies can reduce

emissions and support compliance with increasingly demanding standards.

With engineering and automation design, REEL's Environmental Control Solutions has developed digital tools to allow operators to understand where inefficiencies and emissions are occurring in real time, which makes improvement more targeted and effective. Sustainability is often discussed in broad terms, but at the plant level it comes down to thousands of technical decisions. REEL's Environmental Control Solutions is what turns the client's environmental ambition into operational reality.

AL Circle: As countries push for economic growth while pursuing climate targets, industries face the challenge of balancing productivity with sustainability. In your view, how can policymakers and industrial players collaborate more effectively to achieve this balance?

Bruce Roger Wilson: The most effective collaboration happens when policy ambition is matched by industrial realism. Industry needs clear direction, stable frameworks and long-term visibility in order to invest with confidence. Policymakers, in turn, need practical input from industry on what is technically achievable, how quickly transitions can happen, and where the real barriers lie.

A more effective model is one based on partnership rather than prescription. That means supporting innovation, pilot projects, infrastructure development, skills investment and financing mechanisms that help industries modernise without undermining competitiveness. It also means recognising that different sectors and regions will move at different speeds.

The objective should be to reward measurable progress while maintaining industrial strength. When policy and industry work together in a pragmatic and realistic way, productivity and sustainability do not have to be opposing goals.

AL Circle: With decades of experience working with complex industrial systems across multiple sectors, what advice would you offer to companies and policymakers seeking to build resilient, sustainable industrial ecosystems for the future?

Bruce Roger Wilson: My main advice would be to think long-term, but act in practical steps. Resilient and sustainable industrial ecosystems are built through investment in engineering capability, industrial skills, trusted partnerships, maintainable infrastructure and technologies that solve real problems.

For companies, that means focusing on operational fundamentals while remaining open to innovation. For policymakers, it means creating conditions that encourage industrial investment, technological progress and local capability development over time.

Above all, resilience and sustainability must be designed into the system from the beginning. That includes how equipment is specified, how plants are modernised, how supply chains are structured and how people are trained. The future will favour industrial ecosystems that are not only efficient, but adaptable, technically strong and capable of evolving over the long term.

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Daniel Lim
Sales & Marketing Director of ALCOM

From coil to cooling: ALCOM at the centre of aluminium innovation

Daniel Lim, Sales & Marketing Director of ALCOM, brings over 30 years of diverse industry experience spanning aluminium, construction, automotive, and FMCG sectors. Since joining the company, he has played a key role in driving commercial growth and expanding ALCOM's footprint across global markets.

In his current role, Daniel leads the company's sales and marketing strategy, with a clear emphasis on customer-centric solutions and broadening applications across sectors such as HVAC, building materials, and industrial manufacturing. His leadership has been central to reinforcing ALCOM's position as a reliable supplier of high-quality aluminium rolled products.

A strong proponent of sustainable development, Daniel actively drives initiatives focused on low-carbon aluminium and circular manufacturing practices, aligning closely with the company's long-term commitment to responsible growth and innovation.

AL Circle: From coils to cooling systems, ALCOM sits where aluminium meets end-use demand. How have consumption patterns for rolled products evolved in recent years, particularly across HVAC, construction, and industrial applications?

Daniel Lim: Over the past few years, ALCOM has experienced a notable diversification in demand across its key end-use segments. The HVAC and heat-exchange sector, in particular, has demonstrated steady and resilient growth—largely independent of broader economic cycles, especially across Asia. This trend is underpinned by structural drivers such as climate variability, rapid urbanisation, and rising cooling adoption among expanding populations. At the same time, continuous advancements in technical

propositions have further shaped and elevated consumption patterns.

In contrast, demand from the construction and industrial segments remains more closely tied to regional economic conditions. However, increasing emphasis on environmental performance and durability is accelerating material substitution trends, reinforcing aluminium's role as a preferred choice over traditional metal alternatives.

Across all segments, customers are placing greater emphasis on rolled products that offer consistent performance, reliability, and the flexibility to integrate seamlessly into increasingly complex and demanding value chains.

AL Circle: The global surge in cooling demand and climate-linked temperature extremes is reshaping material requirements for air-conditioning systems. How is this trend influencing demand for aluminium fin stock, and what shifts are you observing among OEM customers?

Daniel Lim: The accelerating global demand for cooling solutions has generated strong momentum for aluminium fin stock—an area where ALCOM is strategically positioned to deliver meaningful value. As OEMs increasingly prioritise heat-transfer efficiency and enhanced corrosion resistance, ALCOM's advanced technologies and focus on high-performance fin stock enable customers to meet more stringent technical and environmental standards.

At the same time, rising demand for customised temper and coating combinations—tailored to diverse operating environments such as coastal and high-humidity conditions—aligns closely with ALCOM's application-driven expertise. This capability allows the company to support increasingly specialised customer requirements with precision and consistency.

As OEMs shift their focus from upfront cost considerations to total lifecycle performance, ALCOM's ability to deliver reliability, energy efficiency, and consistent product quality reinforces its position as a trusted, long-term partner within customers' evolving product portfolios.

3. Unlike upstream producers, downstream players operate closer to margin pressures driven by raw material price volatility. How does ALCOM navigate fluctuations in primary aluminium prices while maintaining competitiveness in export markets?

Daniel Lim: Price volatility in primary aluminium remains a persistent challenge for downstream players, but ALCOM mitigates this through strategic procurement, disciplined inventory management, and a growing emphasis on recycled aluminium within a circular production model. Increasing scrap utilisation not only reduces exposure to price fluctuations but also lowers Product Carbon Footprint (PCF), strengthening competitiveness in export markets.

At the same time, investments in advanced technologies, operational efficiency, and lean manufacturing help safeguard margins. Coupled with ALCOM's differentiated, value-added product offerings and long-term customer partnerships, the company can maintain competitiveness, enable more predictable pricing, and serve customers' production and sustainability goals.

AL Circle: What is ALCOM's annual capacity at the moment, and how much of its share is directed towards export markets? Simultaneously, how has your capacity utilisation and export mix evolved over the past few years, and what trends are you seeing across key regions?

Daniel Lim: ALCOM is currently concluding a record four-year investment programme exceeding USD 150 million, set for completion in 2026. While initially driven by the need to expand capacity, the programme has evolved into the establishment of state-of-the-art manufacturing capabilities that exceed the requirements of niche global markets. This expansion has doubled annual capacity and new confidence; a significant capacity is allocated to export markets.

In recent years, capacity utilisation has strengthened alongside growing demand from ASEAN, South Asia, and Africa—supported by urbanisation, industrialisation, population growth, and the expansion of HVAC OEM footprints. At the same time, ALCOM's export portfolio has advanced in both volume and sophistication, with increasing demand for higher-

specification coils and value-added finishes. Looking ahead, export growth is expected to remain strong, particularly as regional value chains deepen and shift towards more localised, near-market supply models.

5. How is ALCOM innovating in coating technologies and rolled product design to meet evolving technical standards as industries push for higher energy efficiency and thermal performance, given that product specifications have become more demanding?

Daniel Lim: Innovation for infinite possibilities remains central to ALCOM's essence to stay ahead of evolving market expectations. Building on aluminium's natural corrosion resistance, ALCOM's coating and surface-treatment technologies are designed to deliver key functional enhancements, particularly hydrophilicity and improved corrosion durability for HVAC and heat-exchange fin stock.

These coatings enhance condensation control, improve heat-transfer efficiency, and support quieter system performance while remaining fully compatible with downstream processing. ALCOM's R&D teams also collaborate closely with OEM engineers to co-develop fin stock specifications aligned with global standards and application-specific requirements, optimising temper profiles and surface finishes to balance thermal performance with formability. Collectively, these innovations enable higher energy efficiency and extended service life, aligning for customers' increasing focus on performance and sustainability.

AL Circle: How are customers responding to the aluminium value chain, witnessing a gradual shift towards sustainability and low-carbon materials, even at the downstream level? And what role can rolled product manufacturers play in advancing greener aluminium solutions?

Daniel Lim: Sustainability and compliance are becoming central to customer procurement decisions, particularly among OEMs serving Europe, North America, and developed Asian markets. Buyers now require transparent carbon-intensity data, recycled-content verification, supply-chain traceability, and credible third-party certifications such as BIS and EcoVadis to support supplier qualification.

In response, ALCOM has proactively strengthened its sustainability positioning by achieving pioneering Product Carbon Footprint (PCF) certification across its product portfolio, providing transparent lifecycle emissions data. This is supported by a production model that enhances circularity through scrap utilisation, improved energy efficiency, and increasing integration of renewable energy.

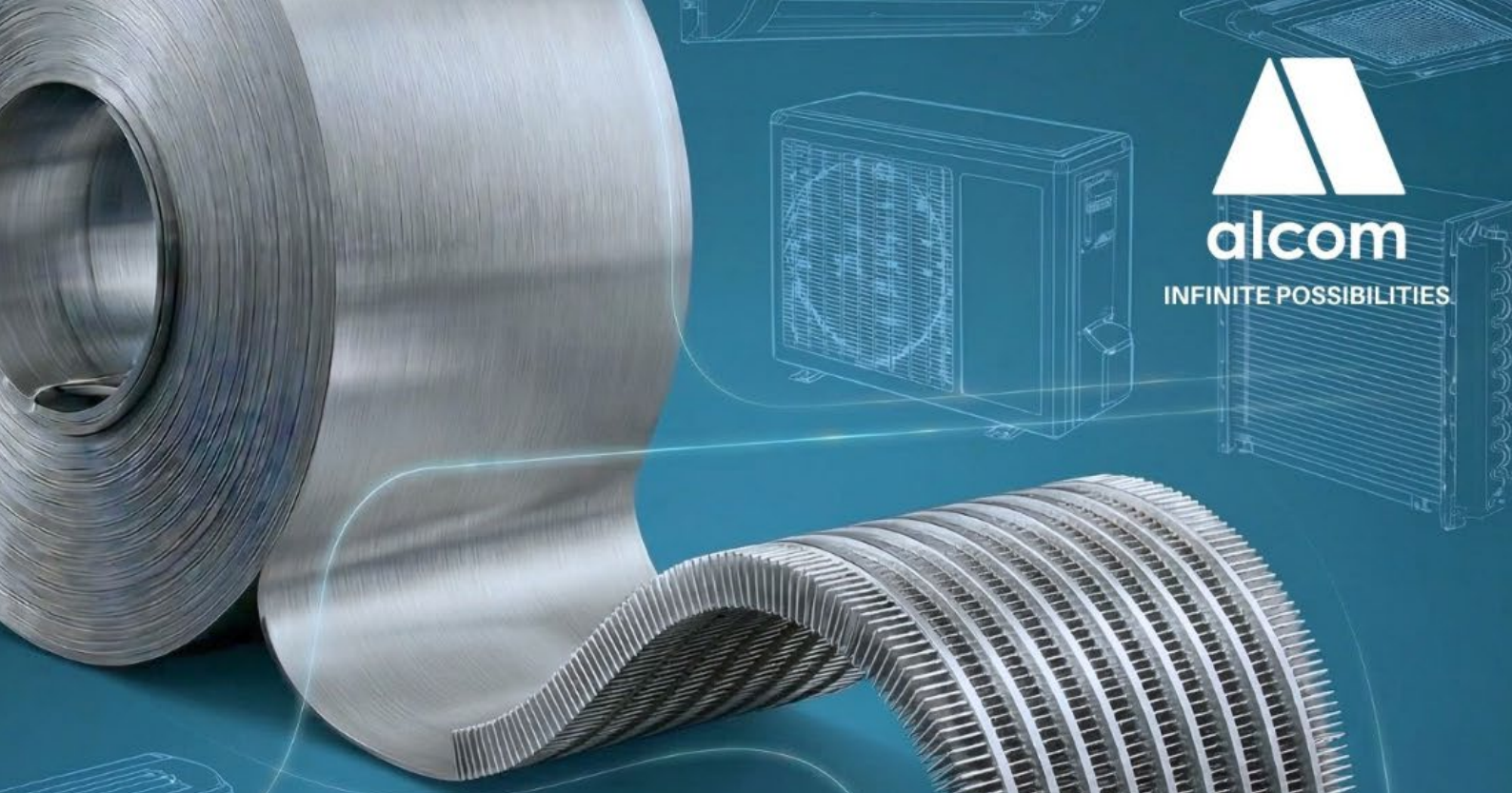
Further initiatives—including renewable energy assessments, scrap optimisation, and closer collaboration across the value chain—continue to reduce overall emissions. Collectively, these efforts align with evolving customer expectations and reinforce ALCOM's position as a trusted supplier of sustainable, compliant aluminium solutions.

AL Circle: HVAC applications account for a substantial share of rolled aluminium demand globally, particularly in Asia. Can you share how much of ALCOM's product portfolio is currently linked to HVAC and heat-exchange?

Daniel Lim: Fin stock represents a relatively small share of global rolled aluminium capacity, but it remains a significant and strategic component of ALCOM's product portfolio. The company maintains a strong focus on HVAC and heat-exchange applications, reflecting its commitment to relevance across key served segments.

With accelerating demand for cooling infrastructure across Asia and a broader shift toward energy-efficient systems, this segment is expected to continue its growth trajectory. Beyond volume expansion, customers are increasingly adopting higher-performance alloys, hydrophilic and functional coatings, and precisely engineered temper specifications to enhance heat-exchange efficiency.

As sustainability, energy performance, and lifecycle cost considerations become more central to market decision-making, fin-stock-based rolled products continue to be a deponent driver for ALCOM.



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ALCOM fin stock is technically verified to IS 737 of Bureau of Indian Standards (BIS), reflecting compliance to established aluminium quality standards for HVAC applications

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Aluminium Company Of Malaysia Berhad
196001000186 (3858-U)

+60 3 3346 6262
+60 3 3341 2793
No. 3 Persiaran Waja, Bukit Raja Industrial Estate
41050 Klang, Selangor, Malaysia.
https://alcom.com.my/
marketing@alcom.com.my

Paul Voss
Director General at European Aluminium

What It Will Take to Keep Aluminium Competitive in Europe?

Paul Voss, Director General at European Aluminium:
BIO: Paul joined European Aluminium from Euroheat & Power, the association for the European district energy sector, where he acted as Managing Director for the past eight years. Mr. Voss is a long-term public affairs and governmental relations expert with nearly 20 years of experience in the Brussels and energy sector. Paul Voss has studied in Canada, France, and Belgium and holds a Master's degree in European Public Policy.

Supply disruptions, geopolitical tensions and energy market volatility are once again reshaping global aluminium markets. Recent tensions in the Middle East have pushed aluminium prices and premiums higher, while rising gas prices are widening Europe's already severe energy cost gap.

For a region that doesn't produce enough aluminium to meet its own demand, these developments are a reminder of how exposed Europe has become to external supply shocks. This matters all the more given that aluminium is officially recognised by the EU as both a critical and strategic raw material under the Critical Raw Materials Act, underpinning key industrial value chains such as mobility, packaging, clean energy infrastructure and mobility. It is also recognised by NATO as a defence-critical material because of its role in military aircraft, armoured vehicles, naval platforms and satellite systems.

Against this backdrop, 2026 will be a pivotal year for industrial policy affecting the sector. Several initiatives now being debated in Brussels will shape whether aluminium production and recycling can remain viable in Europe in the years ahead.

Much has already been said about Europe's ambition to strengthen its industrial base. The real test now is

whether these ambitions translate into conditions that allow energy-intensive industries such as aluminium to remain competitive.

We therefore welcome the European Commission's initiative to strengthen Europe's industrial base through the proposed Industrial Accelerator Act and its recognition of aluminium's strategic importance.

While the direction of travel is positive, the Act will not be a silver bullet for the structural challenges facing Europe's aluminium industry. In the current geopolitical context, additional targeted action will also be required to safeguard Europe's aluminium value chain.

Europe's energy cost gap

Energy costs remain the single biggest threat to Europe's aluminium industry. Producers face electricity and gas prices up to five times higher than competitors in other regions. No efficiency gains can offset that structural disadvantage.

If Europe wants aluminium production to remain, affordable low-carbon energy is essential. This means removing barriers to long-term power purchase agreements, strengthening grids so that renewable generation can better match industrial demand and maintaining key relief measures such as indirect cost compensation beyond 2030. Decarbonisation will require significant investment, and without predictable support frameworks those investments will simply not happen in Europe.

Getting carbon policy right

Climate policy must also provide effective protection against carbon leakage. The Carbon Border

Adjustment Mechanism entered its definitive phase this year and aims to ensure imports face a comparable carbon cost to EU production.

However, in its current design CBAM does not yet provide effective protection for aluminium. The ongoing review must close loopholes and address circumvention risks so that the mechanism strengthens, rather than undermines, the competitiveness of European producers. Aluminium products covered by CBAM must face a carbon cost reflecting emissions from primary aluminium production regardless of scrap content. Otherwise, minimal or difficult-to-verify scrap content could artificially lower declared emissions and distort competition.

Another key element of Europe's climate policy framework is the upcoming review of the EU Emissions Trading System. Discussions on the post-2030 ETS framework, including the future of indirect cost compensation, will be critical for energy-intensive industries such as aluminium. Our priority must be to ensure that carbon leakage protection remains effective during the transition and that free allocation is not phased out for aluminium until CBAM has been fully fixed and demonstrably proven to provide equivalent protection.

Keeping scrap in Europe's circular economy

Circularity is central to decarbonising the aluminium sector and reducing import dependence. Recycling aluminium requires only around 5% of the energy needed for primary production, making scrap a strategic resource. Yet more than one million tonnes of aluminium scrap leave the EU each year, reducing feedstock for European recyclers and increasing costs.

The Commission is currently preparing a measure on aluminium scrap exports, and we are in close and regular dialogue with policymakers as this work progresses. Its effectiveness will be critical in determining whether European recyclers can retain the material needed to sustain circular aluminium production at scale. Beyond this measure, the upcoming Circular Economy Act should establish a stronger long-term framework for the availability and quality of secondary raw materials. Scrap is effectively an energy bank for Europe, and policy should ensure that this value remains within the EU.

Trade policy in a changing global market

European producers also face pressure from unfair trade practices and global overcapacity. These pressures may intensify following the EU's recent free trade agreement with India, where aluminium capacity is expanding rapidly under a state-backed strategy.

At the same time, Europe's trade defence instruments remain slow and largely reactive. Ongoing discussions under the EU's Economic Security Agenda will determine whether Europe equips itself with tools capable of responding more quickly to systemic market distortions.

Europe has set ambitious goals for industrial transformation and climate neutrality. Aluminium will be essential to achieving them. The question now is whether Europe will also create the conditions that allow this industry to remain and invest here. European Aluminium will continue working with policymakers and industry partners to ensure aluminium production and recycling remain competitive in Europe.

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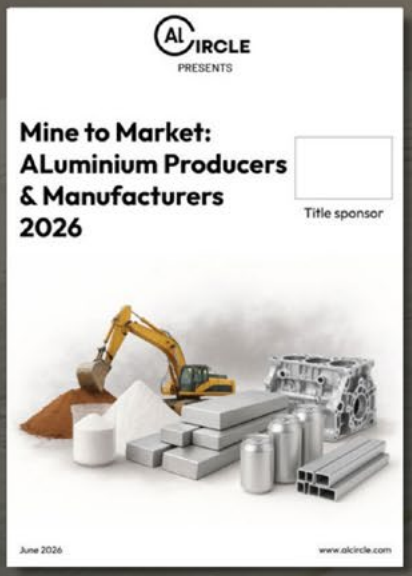

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Matthew Chamberlain
Director at LME

Amid the Middle East crisis, aluminium consumers are seeking alternatives, driving prices higher

Matthew Chamberlain is the Chief Executive Officer of the London Metal Exchange and a member of the Management Committee of HKEX Group. Mr Chamberlain joined the LME in 2012, having advised HKEX on the acquisition of the LME while at UBS. He started his career at Citibank, and holds an MA from Trinity College, Cambridge.

Matthew Chamberlain, Director at LME

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AL Circle: How is the LME adapting to keep pace with the changing needs of clients and users to ensure that it remains the central price discovery venue for the global metals industry?

Matthew Chamberlain: We are in the midst of making significant changes to our market to make trading more efficient and more accessible for all participants, both physical and financial. The programme is called 'Enhancing Liquidity' and we have already delivered changes such as the introduction of new tick sizes and we're currently welcoming applications for a liquidity provider programme. Perhaps the biggest changes will come over the summer when our block trade rules will take effect.

Collectively these changes are designed to enhance liquidity and drive more price competition and liquidity in the central order book – notably on LMEselect, our electronic trading platform – for standardised monthly contracts. Throughout the development of the programme, we have been very conscious of the need

to balance the needs of the physical market with those of financial users – for example, the key physical market daily cash price, and averaging contracts, are not included in our new rules. We believe that these changes will contribute to end-customers getting a better experience from trading on the LME, whether they are from the physical market or the financial sector.

AL Circle: Since the onset of the geo-political tensions in West Asia there is an ongoing aluminium supply chain disruption in the world. Given the scenario where this conflict lasts long, how do you see the future trade flow across the globe mitigating further supply-chain vulnerabilities?

Matthew Chamberlain: The current situation around the Gulf is undoubtedly having a significant impact on supplies of aluminium. The region is responsible for just under 10 per cent of global production, and already we have seen shipments halted and smelters reducing production or suffering damage, while others seek new routes to get their metal to market. In turn, this has fuelled high prices on our market.

This highlights the role that the LME plays as the market of last resort. And by this I mean that if consumers are finding it difficult to obtain metal elsewhere, they know that if they have a contract to buy aluminium on the LME, then this metal will be available to them. Thanks to our network of LME-approved warehouses which enable delivery of physical metal, LME prices are kept in line with the physical prices. We can see that consumers are making use of this facility as we have seen both registered and off-warrant stocks being drawn down.

AL Circle: India-origin aluminium inventory in LME has surged 209 per cent year-on-year, reaching 152,500 tonnes. What do you attribute to this significant growth in India-origin aluminium, and do you see this trend continuing?

Matthew Chamberlain: India is, of course, a valuable part of the LME market. Out of a total of almost 400 active brands listed on the LME, 22 are from India, and of those 8 are for aluminium. There are a number of factors which it seems to me are driving this growth. Some are natural advantages such as India's reserves of bauxite (although we are seeing increasing imports of bauxite, too), as well as growing domestic demand. But it is the investments that big industry players are making, to drive more efficient production, and even 'green' low-carbon production that I believe will continue to ensure that India plays a prominent role in the industry.

AL Circle: Both the LME aluminium premium duty-paid US Midwest and European premium prices are on rising trend, accumulating 23 per cent and 36 per cent, respectively, since the beginning of 2026. If this upward trajectory continues, what impact do you foresee on inventory levels?

Matthew Chamberlain: It's important to note that the LME's core contract is a global one, and so we think about our inventories on a global basis. Of course, if regional premia are high, this may have the effect of causing inventory to move into local consumption – but one also has to consider the effects of tariffs, preferences for certain brands, and so on.

AL Circle: Could you please share with us the LME's progress in developing sustainable metal premiums for its aluminium offerings? Beyond the carbon footprint, what additional sustainability criteria are being considered for these metal premiums, and how do they align with global regulatory trends?

Matthew Chamberlain: The project has been one of our real areas of focus over the past year and we are well on our way to being able to publish premiums for sustainable metals. Having announced our initial plans in April last year, we now have a sister company (CPAL, Commodity Pricing and Analysis Limited) based in Dubai, that has been established to publish prices for sustainable aluminium, copper, nickel and zinc. In addition, we have an agreed pricing methodology that prioritises verified transactions reported directly to CPAL or sourced from a recognised digital transaction platform. This methodology can also be the basis to price other raw materials.

The sustainability criteria for each metal are set out on the LME Insight (the brand name for CPAL) website. For aluminium we have stipulated 8 tonnes CO_2-equivalent/tonne aluminium or below, with third-party sustainability assurance according to the Aluminium Stewardship Initiative Performance Standard.

I'm hugely excited by this work because I think it could provide the key to unlocking the value attached to more sustainable production. This will have sustainability benefits – and could, of course, benefit those Indian companies that are investing in this area.

AL Circle: As secondary aluminium production rises, do you anticipate LME adjusting its trading practices to reflect the growing influence of recyclers?

Matthew Chamberlain: It's important to remember that a large amount of secondary aluminium production is in the form of alloys. The LME has two physically settled alloys contracts, with over 80 per cent of the brands listed against those contracts representing recycled production. So this is an area in which we think the LME's physical market offering is already very strong.

AL Circle: Data and reporting have become increasingly important for industry participants. How is the LME enhancing access to market data and analytics for stakeholders across the value chain?

Matthew Chamberlain: We have taken a number of steps to boost access to data and increase transparency. Last year, we introduced daily off-warrant stock reports that provide greater insight into the stocks across the market. We have also made more information available on LMEpassport – our digital record of sustainability disclosures that are publicly available. Users can now see how brands have established their compliance with our responsible sourcing requirements. And there is a wealth of data about trading, prices and volumes that is available through our LMElive portal which is also available through other data providers.

We're in an industry where market data and insights are crucial and we continue to work on ensuring that we're delivering what the industry needs.

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Manufacturer of Aluminium Window, Door Handle and Curtain Support

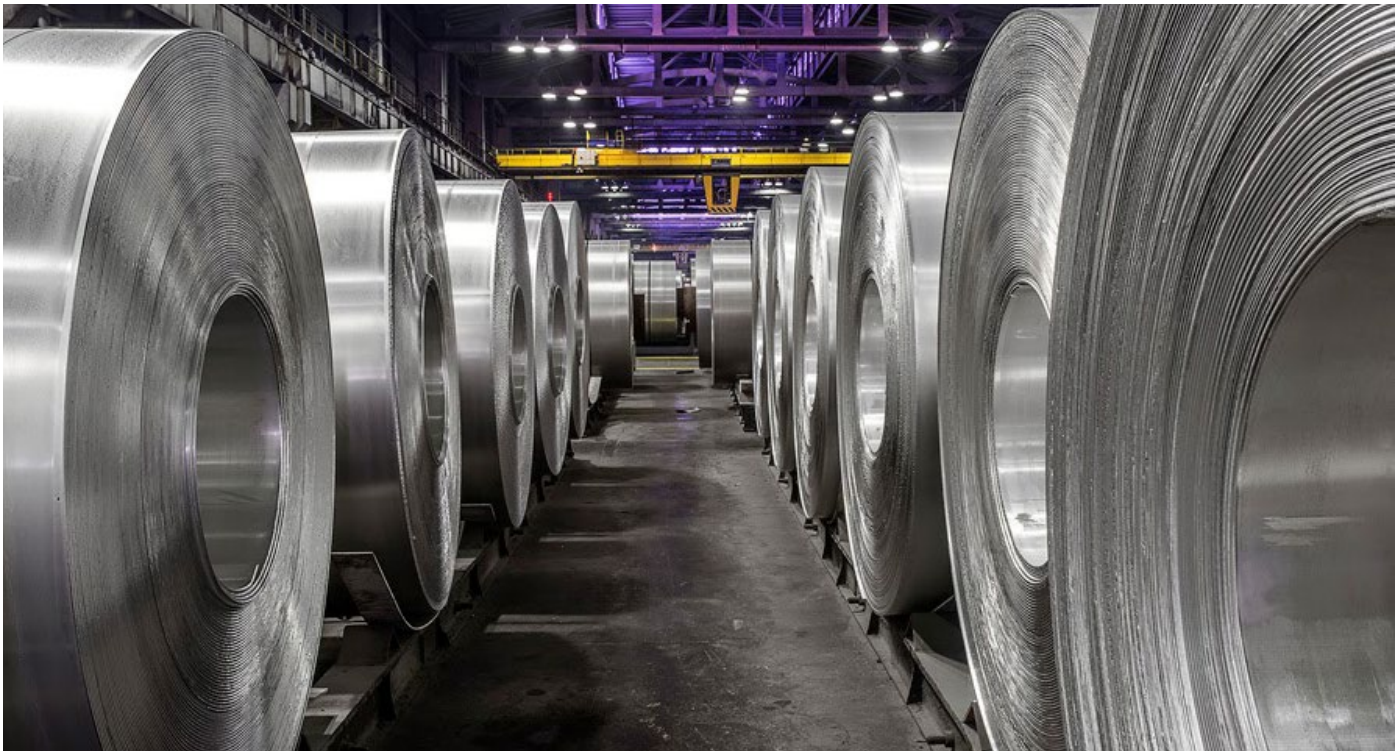
RUSAL

Roman Borisov
Regional Sales Director, IMETAL

From promise to proof: Why 2025–2026 marks a structural shift for the aluminium industry

The aluminium industry is entering a decisive phase — one where ambition alone is no longer sufficient.
If recent years were defined by commitments and long-term targets, then 2025 became a transition point: from positioning and technological development to tangible preparation for industrial implementation. In 2026, this transition is beginning to take on measurable, real-world form.
For RUSAL, this shift has been both strategic and operational.

Throughout 2025, the company focused on advancing low-carbon aluminium technologies and integrating them into its long-term production model. This groundwork culminated in 2026 with the launch of the first industrial-scale inert anode electrolyser — a step that moves the technology beyond pilot stages and into practical application, setting a new benchmark for the industry.
At the same time, the broader market environment is undergoing a fundamental transformation. Geopolitical tensions, disruptions to industrial infrastructure, and increasing fragmentation of global markets have exposed the vulnerability of traditional supply chains. In this context, aluminium is no longer competing solely on cost efficiency. Reliability, resilience, and transparency are becoming critical factors in how suppliers are evaluated.
Recent developments across the market have reinforced this shift. Disruptions affecting key industry players have demonstrated how quickly operational stability can be challenged, reshaping expectations around supply security. As a result, the ability to ensure continuity while advancing technological capabilities is emerging as a defining competitive advantage.



In early 2026, it became clear that the industry is entering a phase where technological capability alone is not enough.

As volatility increases — driven by geopolitical risks, regulatory pressure, and structural shifts in demand — the market is placing greater value on companies that can offer a coherent, system-level understanding of these changes. Individual initiatives are no longer sufficient; what matters is the ability to align technology, operations, and strategy into a consistent and scalable model.

In this environment, competitive positioning is increasingly determined by the ability to combine technological expertise with a clear strategic direction – and to execute on it consistently.

Regulation is accelerating this transformation even further.

Mechanisms such as the Carbon Border Adjustment Mechanism (CBAM) are fundamentally reshaping the competitive landscape. The focus is shifting away from cost optimisation towards verified carbon performance, traceability, and compliance readiness. Low-carbon aluminium is no longer a niche segment — it is rapidly becoming a prerequisite for access to key markets.

Looking ahead, several structural trends are likely to define the industry in 2026 and beyond.

First, the transition from pilot technologies to industrial-scale deployment will accelerate. Solutions such as inert anode technology are moving into real production environments, establishing new benchmarks for the sector.

Second, supply chain resilience will take precedence over short-term cost advantages. In a volatile global environment, the ability to ensure stable and predictable supply will increasingly determine competitive positioning.

Third, the importance of strategic clarity will continue to grow. Companies that are able to integrate technological progress with a consistent, long-term approach to market development will be better positioned not only to respond to change, but to shape it.

For RUSAL, this translates into three priorities: scaling low-carbon aluminium production, reinforcing its role as a technology leader, and contributing to a more transparent and resilient global aluminium market.

The industry is moving beyond declarations. The next phase will be defined by execution—and by those who can turn technological promises into industrial proof.

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Low-carbon aluminium inspired by nature

LOW-CARBON ALUMINIUM

ALLOW has a carbon footprint 4–5 times lower than the industry average for Scope 1 & 2 emissions.

OUR POWER COMES FROM HYDRO ENERGY

RUSAL uses clean energy supplied by EN+, the world's largest private hydropower producer, in its aluminium production.

WE PROVIDE TRANSPARENCY

ALLOW ensures transparency in the supply chain with carbon footprint statement and sustainability passport.

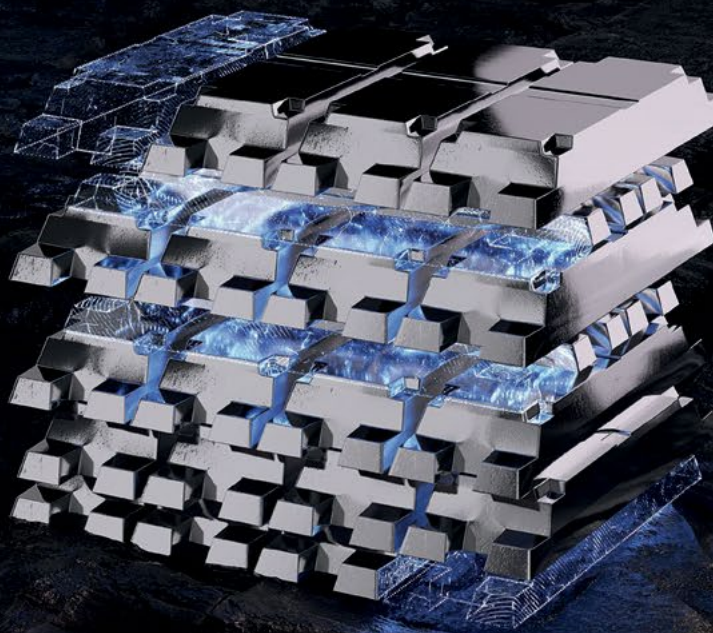
PIONEERING LOW-CARBON ALUMINIUM PRODUCER

4M+

RUSAL markets over 4 million tonnes of ALLOW, offering sustainable aluminium solutions worldwide.

INNOVATIVE TECHNOLOGIES

RUSAL develops groundbreaking INERT ANODE technology for primary aluminium production.
It reduces direct emissions from the electrolysis process to nearly zero, further reinforcing aluminium's position as the material of choice for sustainable products.



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AssanAlüminyum

Göksal Güngör,
General Manager of Assan Alüminyum.

Evolving tariff structures and trade measures are increasingly shaping global trade dynamics

Göksal Güngör serves as the General Manager of Assan Alüminyum, a key player among Europe's flat-rolled aluminium producers. He has significant international experience across the aluminium industry and global business leadership. With a strong focus on sustainable manufacturing, energy optimisation, and international market strategies, he contributes meaningful expertise to the advancement of the sector and the initiatives of the EAFA Roller Group.

AL Circle: European aluminium foil consumption reached around 1 million tonnes in 2024. What factors are driving this steady rise in foil demand across Europe?

Göksal Güngör: The growth in aluminium foil demand across Europe is closely linked to broader structural trends in both packaging and industrial applications. While aluminium's inherent properties, such as its infinite recyclability, lightness, impermeability and superior conductivity, continue to support its relevance, the key driver today is how these attributes translate into more sustainable and resource-efficient solutions. In particular, packaging applications such as container foil and household foil play an important role in extending shelf life, therefore reducing food waste and allowing for resource efficiency.

At the same time, demand for flat-rolled aluminium products is forecasted to expand in the long run in other strategic sectors as well. Developments in mobility, especially the transition toward e-mobility, are introducing new application areas where aluminium's lightweight, high-conductivity and sustainability characteristics are essential, including battery-related components.

As Assan Alüminyum, we approach this evolving

landscape through a strong focus on innovation. With our dedicated and highly qualified R&D engineers, we continuously develop high-performance, sustainability-orientated solutions tailored to emerging application needs, enabling us to respond proactively to changing market dynamics.

AL Circle: Assan Alüminyum exports to more than 70 countries. How do evolving tariff policies and trade measures affect the company's export strategy and competitiveness?

Göksal Güngör: Evolving tariff structures and trade measures are increasingly shaping global trade dynamics, reinforcing the importance of regionalisation and global operational flexibility. In this context, our strategy has been to build a more geographically balanced and resilient operating model.
A key milestone in this journey is our recent investment through Kibar Americas in an aluminium foil production facility in Fairmont, West Virginia. This development marks an important step in our globalisation vision, as it transforms us from an exporter to a local manufacturing partner in the United States. By establishing a production footprint within the market, we are able to respond more effectively to customer needs while reducing exposure to trade-related uncertainties.
The Fairmont facility will primarily serve sectors such as packaging, HVAC, automotive and other industrial foil applications, where proximity, reliability and responsiveness are becoming critical. In an environment where tariff policies and trade measures can rapidly alter competitive conditions, local production provides a significant strategic advantage.
At the same time, our long-standing export capabilities and diversified market presence allow us to maintain flexibility across regions, ensuring that we remain competitive and responsive in a constantly evolving global trade landscape.

AL Circle: Assan Alüminyum operates an integrated recycling facility that remelts both internally produced and externally sourced scrap. What differences do you observe, and how can external scrap quality be improved?

Göksal Güngör: At Assan Alüminyum, circular production is a fundamental pillar of our sustainability approach. Through our integrated recycling facility, we strive to maximise the use of aluminium scrap, leveraging the fact that aluminium is 100 per cent

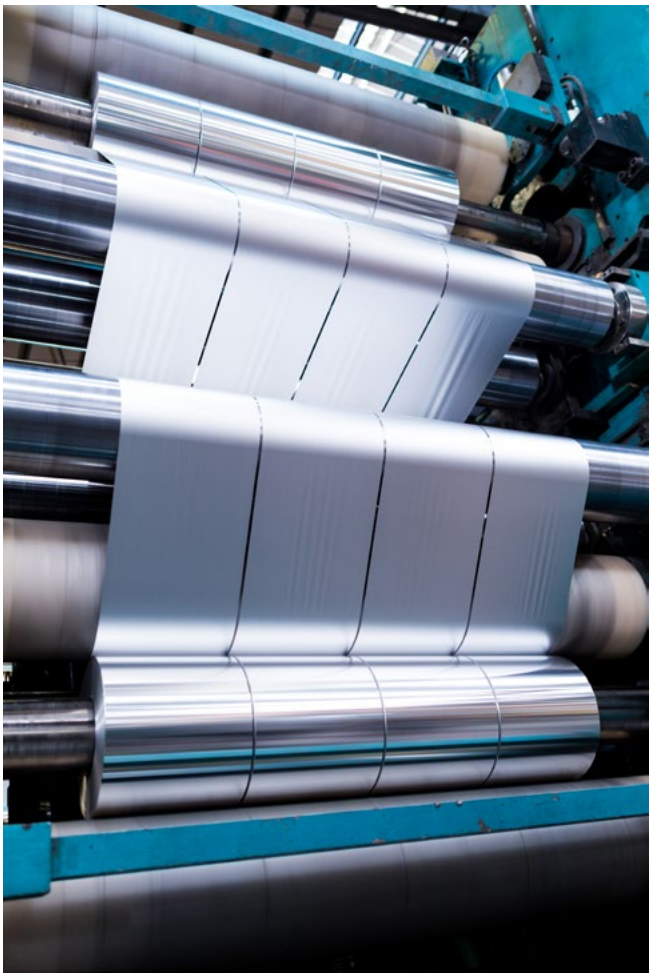
and infinitely recyclable without any loss of quality. All internally generated scrap is directly reintroduced into our production processes, ensuring both efficiency and consistency.
In addition, we actively source and process scrap from our customers as well as post-consumer scrap from the market. While process scrap typically offers higher consistency and traceability, post-consumer scrap can present challenges in terms of contamination and alloy variability. This makes effective sorting and pre-treatment essential for maintaining high-quality output. Improving scrap quality across the value chain requires better segregation by alloy type, reduced contamination and more standardised collection and processing practices. At the same time, it is important to recognise that scrap availability remains limited globally. While we continuously aim to increase the share of secondary aluminium in our production, the availability of high-quality scrap is a key constraint that the entire industry must address to achieve higher circularity rates.

AL Circle: Europe's flat-rolled aluminium demand could rise significantly by 2032. How do you view the evolving opportunities in this market?

Göksal Güngör: Europe represents a key market for flat-rolled aluminium, supported by strong demand across packaging, automotive, HVAC and construction sectors. In particular, the automotive industry is undergoing a significant transformation, where aluminium is increasingly becoming a material of choice due to its ability to support lightweighting and improve overall energy efficiency.
These features, along with aluminium's ability to be recycled and help lower emissions over its lifetime, make it a good fit for the sustainability goals of today's transportation and industrial uses.
At the same time, evolving trade measures are contributing to a more structured and competitive market environment. As Assan Alüminyum, our advanced production capabilities, strong customer relationships and internationally recognised sustainability performance position us well to capture these long-term growth opportunities in Europe.

AL Circle: How is Assan Alüminyum approaching evolving climate policies and mechanisms, such as CBAM, to remain competitive under the new carbon framework?

Göksal Güngör: The increasing focus on carbon transparency and regulatory mechanisms such as the Carbon Border Adjustment Mechanism is redefining competitiveness in our industry. In this context, our approach is built on a clear and structured decarbonisation roadmap, targeting net-zero emissions by 2050 with defined interim milestones. Unfortunately, the current CBAM framework is not appropriate for the aluminium value chain, and it does not allow low-carbon products to have lower CBAM costs.
A key component of this strategy is our investment in renewable energy. Through our hydroelectric and solar power generation, combined with International Renewable Energy Certificates (I-RECs), we are able to fully offset our market-based Scope 2 emissions. This not only strengthens our environmental performance but also enhances our resilience against energy market volatility.
In parallel, our ASI-certified operations and CDP-recognised climate disclosures reflect our commitment to transparency and alignment with global ESG standards. We also closely monitor the development of CBAM and similar frameworks, and with our accumulated expertise, we actively support and guide our customers in adapting to these evolving regulatory requirements.



AL Circle: How is Assan Alüminyum navigating the current geopolitical situation, particularly in relation to the Middle East?

Göksal Güngör: The current geopolitical environment is creating significant pressure across the global aluminium value chain. Disruptions on critical trade routes, such as the Strait of Hormuz, coupled with risks to energy infrastructure, are affecting raw material availability, logistics, and overall cost structures. In particular, rising energy and petrochemical prices, along with increasing freight and supply chain costs, are placing additional pressure on downstream producers.
As Assan Alüminyum, we address these challenges through a strong focus on resilience and risk management. Our diversified supplier portfolio, managed in line with our ISO 31000-certified Risk Management System, allows us to balance sourcing across multiple regions. In addition, our ISO 22301-certified Business Continuity Management System ensures that we are prepared for potential disruptions through well-defined contingency plans.
While external pressures are reshaping cost dynamics across the industry, we remain committed to maintaining reliable supply and transparent communication with our customers, ensuring continuity even in a highly volatile environment.

AL Circle: How is Assan Alüminyum advancing its decarbonisation roadmap and integrating sustainability and CSR into its growth strategy?

Göksal Güngör: Sustainability is fully embedded in our long-term growth strategy, with decarbonisation as one of its central pillars. Our roadmap toward net-zero emissions is supported by continuous investments in renewable energy, increased energy efficiency and the expansion of circular production practices.
A key element of our approach is the development of recycling-friendly alloys, such as 3423 and 6005A, which are designed to support higher recyclability while maintaining strong performance characteristics. Through our R&D capabilities, we continuously work on improving material efficiency and enabling more sustainable product lifecycles.
In addition to environmental initiatives, our sustainability framework also includes social responsibility and biodiversity preservation projects, reflecting a holistic approach to responsible production.
We believe that long-term success in our industry depends on the ability to combine operational excellence with environmental and social impact, and we continue to advance in this direction.

Creating the Future through

Sustainability

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Mario Colombo
FIMI Group Sales Director

Automation and smart manufacturing are fundamentally reshaping the metal processing industry

AL Circle: How do you assess the current market size and growth trajectory of aluminium coil production in Europe, and what share of this market does FIMI realistically aim to capture with its processing solutions?

Mario Colombo: The current geopolitical landscape continues to introduce a high level of uncertainty, making precise forecasting particularly challenging.

That said, the European aluminium industry is facing well-known structural challenges: energy-intensive production, higher energy costs compared to regions such as China and the United States, and constraints in scrap availability.

Despite these factors, Europe remains the second-largest aluminium coil production market globally, characterised by a mature but resilient industrial base.

Looking ahead, we expect the market to remain stable or slightly grow over the next two years, followed by moderate expansion towards 2030. In the longer term, the outlook is structurally positive, driven by key megatrends such as decarbonisation, electrification, and the increasing demand for lightweight materials.

From FIMI Group's perspective, our positioning in finishing and processing lines rather than primary production allows us to maintain a positive outlook. Our growth expectations are driven not only by market dynamics but also by our continuous product diversification and technological development, which enable us to address a broader range of customer needs.

AL Circle: Aluminium processors are increasingly focused on productivity, yield optimisation, and reduced downtime. How much improvement in all

these areas have FIMI's coil processing lines delivered for customers in the past year, and how do you expect digitalisation and automation to further enhance these gains?

Mario Colombo: Improving productivity, yield optimisation and reducing downtime are now top priorities for aluminium processors worldwide.

In this context, FIMI Group has developed its proprietary digital platform, FIMI Digital, specifically designed to support customers in operating their lines in a more efficient and optimised way. Through advanced monitoring and predictive maintenance capabilities, customers can significantly reduce unplanned downtime and improve overall equipment effectiveness.

At the same time, we are continuously increasing the level of automation across our lines, not only to enhance operational efficiency but also to improve safety conditions and reduce dependency on manual operations.

Looking ahead, we expect digitalisation and automation to further accelerate these gains, enabling smarter, data-driven production environments.

AL Circle: Global aluminium coil production remains concentrated in a few major markets. Which regions or countries represented the most significant opportunities for FIMI in 2025, and what strategic steps are you taking in 2026 to strengthen your presence in those markets?

Mario Colombo: In 2025, Turkey and India represented two of the most dynamic and promising markets for FIMI Group, where we successfully secured important references.

Building on this momentum, our strategy for 2026 is to further strengthen our presence in the Middle East, a region showing increasing investment in aluminium downstream processing. To support this expansion, we are actively participating in industry conferences and exhibitions, enhancing our visibility and strengthening relationships with key stakeholders.

AL Circle: Low-carbon aluminium is now a key purchasing criterion for downstream industries. How is FIMI enabling aluminium coil producers to manufacture low-carbon products with its advanced solutions, while maintaining productivity and product quality?

Mario Colombo: As a supplier of finishing equipment, FIMI Group does not directly influence primary aluminium production processes.

However, we contribute indirectly by improving the overall efficiency of processing lines, particularly in terms of energy consumption and operational optimisation. These improvements support our customers in their broader sustainability strategies, helping them reduce their environmental footprint while maintaining high productivity and product quality.

AL Circle: Energy costs continue to put pressure on aluminium producers across Europe and other regions. How is FIMI integrating energy-efficient technologies into its coil processing lines to help customers reduce operating costs and energy consumption?

Mario Colombo: Energy costs remain a critical factor for aluminium producers globally.

From a cost-efficiency perspective, our approach focuses on increasing automation levels, allowing a higher number of functions to be performed

automatically and significantly reducing the need for manual intervention and the number of operators required.

In terms of energy consumption, while coil processing technologies are already well-established, FIMI Group continues to invest in incremental innovation, refining machine performance and improving the energy efficiency of individual components as well as the entire processing line. These continuous improvements translate into tangible savings for our customers.

AL Circle: With ongoing geopolitical disruptions and fluctuating primary aluminium supply, downstream processors may face raw material constraints. How could such volatility affect investment decisions for new processing lines, and what implications does this have for equipment providers like FIMI?

Mario Colombo: Market volatility, driven by geopolitical disruptions and fluctuations in primary aluminium supply, has a significant impact on investment decisions.

We have already experienced delays, postponements and, in some cases, cancellations of new projects, as customers adopt a more cautious approach in an uncertain environment.

For equipment providers like FIMI Group, this scenario requires greater flexibility, a strong focus on long-term partnerships, and the ability to support customers not only in expansion projects but also in optimising existing assets.

AL Circle: Automation and smart factories are reshaping metal processing. How is FIMI integrating data analytics, predictive maintenance and digital monitoring into its aluminium coil processing solutions?

Mario Colombo: Automation and smart manufacturing are fundamentally reshaping the metal processing industry.

FIMI Group is integrating advanced digital solutions through its FIMI Digital platform, which enables real-time data collection, monitoring, and analysis across the entire processing line. This allows customers to gain full visibility of their operations, supporting data-driven decision-making and continuous process optimisation.

Key features include predictive maintenance tools, which help anticipate potential issues before they occur, reducing downtime and maintenance costs, as well as performance analytics that enhance productivity and product quality.

By combining mechanical excellence with digital intelligence, FIMI Group is supporting its customers in the transition towards fully connected, smart processing lines, capable of delivering higher efficiency, reliability, and competitiveness in an increasingly demanding market.

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FIMIGROUP will be present at the following aluminium events:

World Aluminium Summit | London, UK | 12-14 May 2026
Aluminium China | Shanghai, China | 08-10 July 2026 | Hall 1 - Stand M26
Aluminium | Düsseldorf, Germany | 06-08 October 2026 | Hall 4 - Stand F44

FIMIGROUP

via dell'Industria, 15
23897 Viganò (LC)
Tel. +39 039 92141
info@fimigroup.it
www.fimigroup.it

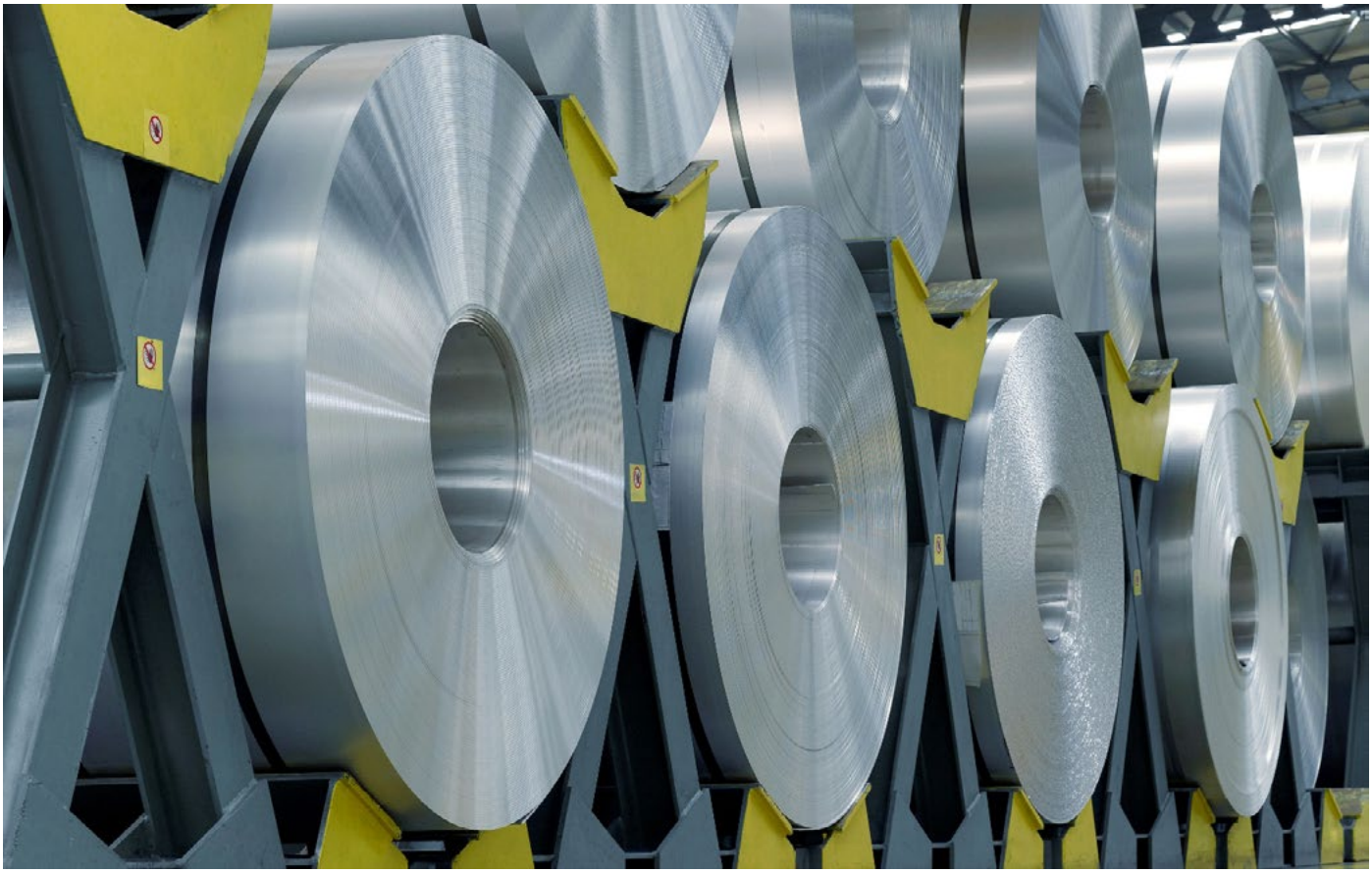
René Liedtke
Europe Segment Leader – Non-Ferrous, Quaker Houghton.

One theme dominates the aluminium industry in 2026: minimising risk without compromising progress

René Liedtke is the Europe Segment Leader for Non-Ferrous at Quaker Houghton. He began his career in the aluminium industry in 2014 as a project manager for lubricant development at the R&D centre of Hydro Aluminium Rolled Products in Bonn, Germany. In 2018, he relocated to Norway, where he took on a series of operational roles at the Hydro and later Speira rolling plant in Holmestrand, spanning technical and production management. He joined Quaker Houghton in 2022, bringing with him a PhD in organic chemistry and deep first-hand knowledge of what mills need from their process fluid partners.

AL Circle: What are your thoughts on the aluminium rolling market in 2026? What are the biggest challenges mills are dealing with on a daily basis?

René Liedtke: The market looks different depending on where you are operating. In the US, Greenfield rolling mill investment is back for the first time in decades. Novelis' Bay Minette, Alabama, facility is one clear signal of a push to build domestic capacity, particularly for canning, fuelled by a growing focus on recycling. In Europe, diversification across canning, construction, and speciality products has helped mills weather recent challenges in the automotive industry. In China, the focus is on volume and efficiency at scale. And across the Middle East and India, new investments to meet growing demand are firmly on the rise.
Across all regions, one theme dominates in 2026: minimising risk without compromising progress.
Mills are navigating geopolitical uncertainty, supply chain pressure, and rising input costs, while still needing to meet growing demand and the high process and quality standards for new product lines. Throughout the year so far, Quaker Houghton has been able to support our customers with these challenges thanks to



our deep application expertise as well as our multiple manufacturing sites globally and local raw material sourcing strategies.

AL Circle: Demand for rolled aluminium is forecast to grow significantly by 2030, driven by EVs, packaging, and energy infrastructure. How is that growth changing what mills actually need from their process fluids?

René Liedtke: The needs are not uniform. A small mill requires a different approach to a large mill, so in many cases, we're supporting our customers who are scaling their operations to meet this growing global demand. Likewise, a mill running primarily canning alloys, for example, has very different fluid needs than one producing a wider portfolio. For more diversified mills, the right answer depends on the alloy mix and the specific challenges they are dealing with. This support isn't limited to lubrication chemistry — our customers can rely on our expertise and deep knowledge of the full rolling process. Our goal is to enable our customers to embrace these new market opportunities.

Battery foil is where we're seeing genuinely new demands. These coils are handled in clean room environments, surface tension specifications are extremely tight, and requirements are getting tighter every year. It is driving a new level of precision in how rolling fluids for that segment are formulated and applied. The starting point is always the mill's specific process demands, and the solution follows from there.

AL Circle: Walk us through what is new from Quaker Houghton in 2026. You have QH EVEROLL™ A 5000 continuing to gain traction and two new technologies launching this year. What can you share?

René Liedtke: QH EVEROLL™ A 5000, our innovative non-soap hot rolling fluid launched in 2024, delivered a 30 per cent reduction in oil consumption vs soap-based chemistry in its first implementation at Speira, Holmestrand. That is a meaningful result for any rolling mill, considering both cost and environmental footprint. Further trials are in the pipeline for 2026, but it is not a one-size-fits-all recommendation.

We're also continuously working to improve our customers' operations through existing technology platforms. For example, one inherent, universal challenge with soap-based chemistry is biostability. All emulsion systems — regardless of the brand or supplier — have bacteria present at some level. This can cause unpleasant odours, as well as increased rolling fluid consumption due to the breaking down of ester molecules that provide lubricity. We've developed

a non-biocidal solution to this problem that can be incorporated into existing formulations, so customers will be able to keep using the technology they know delivers but also benefit from meaningful improvements in their operations.
Battery foil rolling is another focus for 2026. Jointly with Achenbach, the leading OEM in this field, we have been developing a new battery foil rolling additive technology. Battery foil demands ultra-thin gauges and extreme surface cleanliness — specifications the aluminium industry has not had to meet at this scale before. Combining Quaker Houghton's chemistry expertise with Achenbach's state-of-the-art equipment has produced a genuinely differentiated offering for this fast-growing segment, and we're looking forward to sharing more of this later this year.

AL Circle: Aluminium rolling is a very complex operation with a high price for any unplanned or prolonged downtime. How does Quaker Houghton approach this challenge and de-risk new fluid transitions for customers?

René Liedtke: We take a unique and rigorous approach to our product development. This starts in the laboratory, where our test methods are customised to replicate the rolling process — far surpassing industry standards. This allows formulations to be optimised before anything comes near a production line. For significant technology changes, we can go a step further by using our pilot mill, a unique capability among fluid suppliers, to trial the chemistry under real-world conditions. The pilot mill setup can be fine-tuned to mimic the customer's rolling process, providing proof of performance before a customer commits to a full production trial.
AL Circle: Quaker Houghton also supplies downstream industries such as cans, automotive and aerospace. What benefit does this integration bring to the aluminium value chain?

René Liedtke: It's true that wherever metal is being rolled, formed, cut, or cast, it's very likely there will be a Quaker Houghton product nearby. For our rolling mill customers, this means we add value not just through our deep understanding of their process but also our insight into the needs of their customers.
For example, we have a dedicated team for can production that works directly with these downstream customers, understanding their process requirements, new industry trends and any challenges they may be facing. This knowledge then supports product innovation and optimisation for rolling mills. One strong proof of this synergy is our market-leading CORALUBE® 4000 CPL technology. The lubricant is purchased by the mill and applied to the finished coil to protect the surface during storage and transport, but it is also required by the can maker as a pre-lubricant for the first stage of their production. The high performance and resulting success of this product can be attributed to our presence and expertise at both levels of the value chain.

AL Circle: Looking at the next three to five years, what is the single biggest shift in what rolling mills will expect from their process fluid partners?

Rene Liedtke: Real-time process control of the lubricant system. Standard practice today is to pull a one-litre sample from a system holding 500,000 litres, run it through a lab, and get one data point per day. There is significant manual labour, significant variation, and significant lag between a problem developing and being caught.

Quaker Houghton has developed QH FLUIDCONTROLTM LMS, an inline hardware solution that measures key emulsion parameters continuously, with a new reading every few minutes for every coil produced. Concentration, pH, conductivity, temperature: all in real time, with automatic dosing when parameters drift. We are the only supplier offering both lubricant knowledge and process control capability in a single integrated online system. That is where the industry is going, and the capability is already here.

Advancing the metal of modern life. Together.

Quaker Houghton is the leading global supplier of industrial process fluids, continually improving and innovating to keep our customers ahead in a changing world. Through our deep process expertise and unrivaled R&D capabilities, we develop and customize the latest, proven technologies to improve your processes and maximize your profitability.

Find out more at quakerhoughton.com

Quaker Houghton™
Forward Together™

Chinelo-Etiaba
Chief Operating Officer and Membership Director

Why Members Matter: How members working towards long-term goals through ASI are helping themselves, the industry, the planet and people.

At the heart of every sustainability initiative are people: people who show up, make commitments, and take responsibility for driving change—not just for their own organisations, but for the wider industry and the world it impacts. In ASI's case, those people are our members and stakeholders.

When I joined ASI in 2021, I came into a familiar membership space, but in a new industry - one filled with people who loved maths and graphs and didn't seem to need much convincing to join ASI in its global mission to recognise and collaboratively foster the responsible production, sourcing and stewardship of aluminium. The sustainability challenges were clearly articulated: **climate** – align with pathways for a 1.5C scenario, **nature** – deliver nature positive outcomes, **circularity** – structural change for circular economies, and **human rights** – thriving and resilient communities.

There was strong multi-stakeholder support for our initiative, and everything felt perfectly aligned.

A few years on, and the sustainability landscape has become more complex for businesses. The global economy shifted, and with it, the industry's focus. The collective "we" that once defined our conversations slowly made room for more individual priorities—my supply chain, my footprint, my problem, my solution.

While an understandable position in a more challenging and pressured environment, this new attitude raised an important question: how do we hold on to a shared sense of responsibility and pursue a more excellent way – together? After all, the challenges we face were created collectively, and they can only be solved collectively.

That's where ASI remains essential. We bring together producers, users, and stakeholders across the aluminium value chain with a shared commitment to maximise the contribution of aluminium to a sustainable society.

Members are the real MVPs

In a world that's increasingly individualistic, our members still believe in our collective responsibility to drive change. ASI Members are not one single, uniform group — they're diverse, and that's what makes them special. Each member brings their own priorities and perspectives, and even when needs overlap, no two are exactly the same. However, through ASI's multi-stakeholder decision-making and consensus-building processes, members can find common ground. They collaborate, agree, and create solutions for the global challenges we all face. Members bring expertise and real-world insight that turns strategy into action. They innovate and make investments that push the industry forward. And most importantly, they create a critical mass for sectoral change at scale through their market influence and potential for supply chain push/pull.

In it for the long haul

The sustainability challenges we're tackling today didn't emerge overnight, and they won't be solved overnight either. They were shaped over time, across global systems and supply chains — and the solutions will take time too and result from global concerted action and teamwork. No single company can navigate today's challenges alone.

This is why membership in ASI is a long-term relationship built on trust, shared responsibility, and a belief in collective action. Membership isn't just about benefits on paper. It's about the meaning it holds for people and businesses who are committed to long-term progress.

ASI members understand this. They stay engaged even when progress feels slow and the path ahead is complex. Through ASI, members support their own progress by tapping into the secretariat's expertise and learning from a wide range of stakeholders — including civil society and rights-holders. These diverse perspectives help members build stronger, more responsive company policies – keeping them ahead of the curve.

Looking Ahead

As the aluminium industry confronts decarbonisation, supply-chain disruption, geopolitical uncertainty, and an ever-evolving sustainability agenda, the role of members has never been more critical. Members are both active partners in — and beneficiaries of — ASI's multi-stakeholder network and third-party certification programme.

Like a body, the industry is strongest when every part plays its role. ASI membership provides the framework

for this collaboration, creating a shared space where diverse stakeholders work together — not because they are identical, but because they are interdependent. ASI's active on the ground involvement in complex settings with both companies and community stakeholders in upstream environments also serves as a benefit to members further downstream who need to know that supply chain risks upstream are being addressed by the system.

ASI's challenge and privilege is therefore understanding the varied motivations and pressures our members face and designing solutions that can be scaled — "using the one to solve for the many."

Membership is not simply about what ASI offers; it's about what members need and how they experience support when it matters most.

Our role as a global membership, standards -setting and certification organisation is not to declare value, but to design for it and help members and stakeholders recognise it — by making clear what's available, how to use it, and why it matters.

In an industry that quite literally builds for the long term, membership offers continuity and collective strength. The future of the aluminium industry will not be defined by a single entity but by collective action, shared responsibility, and members working together for long-term impact.

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Josef Nierling,
CEO of Porsche Consulting Italy.

"The current energy situation is highly complex, and many companies are under pressure"

Josef Nierling serves as the CEO of Porsche Consulting Italy, the consulting arm of Porsche AG headquartered in Stuttgart. He focuses on strengthening competitiveness through innovation, employment, sustainability, and expansion into high-growth markets such as China. He is a regular contributor to leading national publications including Il Sole 24 Ore, Corriere della Sera, Il Foglio, and Avvenire, as well as to academic platforms like Harvard Business Review Italia. He has also contributed to several books, including "Modello G" (F. Cancellato, Università Bocconi Editori), "Industria 4.0: Uomini e macchine nella fabbrica digitale" (Magone et al., Guerini), and "Il lavoro che serve. Persone nell'industria 4.0" (Magone and Mazali, Guerini).

AL Circle: European and global manufacturers are facing elevated energy costs, carbon pricing exposure, and supply chain volatility. From your recent engagements, where are industrial companies still structurally inefficient? And what are the quickest levers to restore competitiveness?

Dr Josef Nierling: Thank you for the question and for inviting me. The current energy situation is highly complex, and many companies are under pressure at this moment due to increasing costs and risks. We see this in recent developments such as the Iran war and the blockade in the Strait of Hormuz, which are clear examples of international energy exposure.

More broadly, we see a significant difference between geographic regions and even within Europe from one country to another, depending on the energy mix. Some countries benefit from abundant oil and gas, others have invested heavily in nuclear power, such as France, and others again in renewables. Energy demand also varies by sector, but industries such as metals or

chemicals are particularly sensitive.

As a result, global manufacturing footprints of leading players and their supplier base have shifted geographically according to energy costs. The green transition in Europe and carbon pricing mechanisms such as the Emissions Trading System have further accelerated this dynamic.

Paradoxically, the greatest inefficiencies are often found in countries and industries where energy costs are low, while in high-cost environments, there is a much stronger focus on efficiency. Today, technologies like continuous monitoring, optimisation, and AI-supported solutions offer significant potential to improve energy efficiency.

In the short term, companies should focus on reducing energy consumption, renegotiating supplier contracts, entering long-term purchase agreements, and investing in self-generation. Longer-term solutions such as new-generation nuclear technologies may take around ten years to materialise.

AL Circle: With mechanisms like the EU Carbon Border Adjustment Mechanism reshaping trade economics, how prepared are heavy industries — particularly energy-intensive sectors — in measuring, verifying, and reducing emissions? Where are companies underestimating the challenge?

Dr Josef Nierling: Perhaps the biggest blind spot is that carbon pricing is entering a new era of commercial negotiations. It is no longer only about sustainability reporting. The Carbon Border Adjustment Mechanism, now in force, is not a national tax but an international trade regulation that effectively turns CO_2 into a cost at the border.

Its purpose is to align pricing and competitiveness between foreign producers and local producers subject to the Emissions Trading System in Europe. For energy-intensive industries such as metals, this can translate into a double-digit risk on margins, which is a very delicate equation.

Most players are capable of estimating Scope 1 and Scope 2 emissions, but typically at an aggregate

level. However, this regulation requires much deeper granularity, including plant-level and product-specific data that must be verifiable under EU monitoring and reporting rules.

Many companies are not fully prepared for this. Without proper systems to monitor and verify data, they risk relying on default EU values, which are more punitive. Therefore, the quality of data should not be underestimated, as it will translate into real cash outflows in the future.

AL Circle: Industry 4.0 has been discussed for over a decade. In your implementation work, what differentiates companies that genuinely extract ROI from digitalisation from those that remain stuck in pilot mode?

Dr Josef Nierling: Thank you for the question, as this is at the core of Porsche Consulting's work. We have been working on Industry 4.0 and smart technologies for more than ten years.

The answer is very clear: companies should not start from the technology itself, but from the competitive advantage they want to achieve — for example, lower costs, better demand forecasting, or shorter delivery times. The purpose of digital transformation must be clearly defined.

From there, companies should design integrated systems that serve this specific objective. Today, we see the same pattern with artificial intelligence and new generations of robotics. There is a lot of hype, and many companies are experimenting, which is perfectly fine, as long as they do not expect immediate impact on profit and loss.

If the goal is a step change in productivity and financial performance, the focus must be on the system rather than the technology.

AL Circle: For capital-intensive sectors such as metals, automotive, and industrial goods, how should leadership teams rethink capex strategy in an era of geopolitical fragmentation and uncertain demand cycles?

Dr Josef Nierling: This geopolitical fragmentation is clearly driving companies towards a "local-for-local" strategy. Large multinationals are increasingly organising themselves around three relatively independent hubs: the Americas, Europe, and Asia.

Each of these hubs develops local products to meet specific market needs and incorporates dominant technologies, such as software systems in the automotive sector. Manufacturing footprints are also being reshaped due to tariffs and regional considerations.

This will lead to resizing in some regions and significant investments in others, with increasing independence between these hubs. During this transformation, suppliers should stay close to their customers, both physically and in terms of relationships.

It is crucial to understand the customer's strategy, follow their investments, and build strong relationships that can be maintained even as industrial footprints evolve.

AL Circle: Automation and AI are accelerating, yet industrial labour shortages persist. In practical terms, what organisational changes are required?

Dr Josef Nierling: As mentioned earlier, many new technologies are emerging, including artificial intelligence, autonomous automation, and even humanoid robotics. These will bring significant flexibility and improvements.

However, technology itself is becoming increasingly user-friendly, so the main concern should not be digital training or upskilling alone. The real challenge is attracting talent that can translate these technologies into applications with a tangible impact on profit and loss.

Companies need to build a workforce with strong learning agility — the ability to continuously acquire new skills — as future workers will transition across multiple roles during their careers.

AL Circle: In sectors like primary metals or advanced

materials, where margins are often cyclical, what operational discipline separates the top-quartile performers from the rest?

Dr Josef Nierling: We are currently witnessing strong cyclical dynamics, for example, in the automotive sector in Europe. The key difference between top performers and others lies in operational discipline.

First, a rigorous and structured approach to cost management and operational excellence. Leading companies design their organisations to survive downturns, not only to maximise performance during upcycles.

Second, data-driven decision-making on product mix and asset utilisation. Companies today have the tools to anticipate cycles, reallocate capacity, and adjust commercial priorities before impacts are visible in profit and loss statements.

Third, capital discipline — managing investments, maintenance, and working capital strategically. During downturns, it is not about freezing all investments but making selective and strategic decisions, and during upcycles, avoiding volume-driven approaches at any cost.

AL Circle: Secondary aluminium production is gaining strategic importance amid decarbonisation pressures. Do you see scrap access becoming the next competitive moat in aluminium?

Dr Josef Nierling: This depends on the market context. In Europe, scrap access is already a strategic constraint. With high ETS prices and customer demand for verified low-carbon aluminium, access to high-quality scrap has become critical.

In some cases, this creates a competitive moat and even a barrier to entry. In contrast, in markets such as India, scrap still plays a secondary role, with competitiveness largely driven by primary production and captive energy.

However, the gap is closing rapidly, particularly for exporters exposed to European regulations. For primary producers, the implication is clear: recycling should no longer be treated as an add-on, but as a core strategic element.

In Europe, this is about defending competitiveness today, while in India, it is about securing access to future low-carbon markets.

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The 3rd China Green Aluminium Summit 2026

May 20-21, 2026 Shanghai, China

Contact us to book a seat: marketing@ecvinternational.com

Aluminum Journey Continues – Next Stop Ahead

Indonesia Critical Minerals Conference & Expo 2026

Conference Date: June 3-5, 2026

Location: Jakarta, Indonesia

- Attendees: Aluminum (bauxite, alumina, electrolytic aluminum, aluminum processing, and related enterprises), nickel, cobalt, tin, coal, solar & energy storage

Contact:
Yunfei Zhong
zhongyunfei@smm.cn
+86 131 0936 7300

Scan to consult

SMM (3rd) South China Nonferrous Metals Annual Conference

Conference Date: September 9-11, 2026

Location: Nanning, Guangxi, China

- Attendees: Nonferrous metals industry enterprises

Contact:
Weiquan Ding
dingweiquan@smm.cn
+86 180 2934 4837

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ASCC SMM (8th) Automotive Supply Chain Conference & New Material Application Summit

Conference Date: September 2026

Location: Hefei / Suzhou / Shanghai, China

- Attendees: Global automotive OEMs, auto parts manufacturers, aluminum die-casting enterprises, aluminum extrusion enterprises, aluminum rolled products enterprises, magnesium alloy enterprises, steel mills, government, universities, industry associations, high-end intelligent equipment providers, etc.

Contact:
Jerry Lv
lvjunlei@smm.cn
+86 176 1601 9596

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2026 SMM (15th) Aluminum Industry Annual Conference

Conference Date: October 13-14, 2026

Location: Chongqing, China

- Attendees: Bauxite, alumina, electrolytic aluminum plants, traders, aluminum processing enterprises, government, industry associations, and related industry chain enterprises

Contact:
Yunfei Zhong
zhongyunfei@smm.cn
+86 131 0936 7300

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SMM AICE 2026 (1st) Southeast Asia Aluminum Conference

Conference Date: November 26-27, 2026 (TBC)

Location: Ho Chi Minh City, Vietnam

- Attendees: Bauxite, alumina, electrolytic aluminum, aluminum processing, traders, government, industry associations, and aluminum upstream/downstream industry chain enterprises

Contact:
Kexin Lou
loukexin@smm.cn
+86 190 6801 9380

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2026 SMM Southwest Die-Casting Industry Conference

Conference Date: November 19-20, 2026

Location: Chongqing, China

- Attendees: Aluminum die-casting enterprises, magnesium die-casting enterprises, casting aluminum alloy enterprises, magnesium alloy enterprises, traders, government, universities, industry associations, high-end intelligent equipment providers, etc.

Contact:
Weiquan Ding
dingweiquan@smm.cn
+86 180 2934 4837

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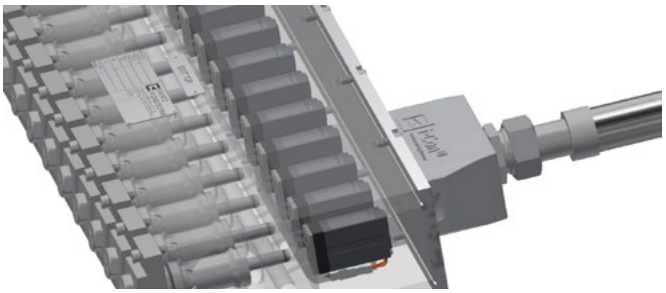
EVERTZ HYDROTECHNIK

Thomas Rosenbauer
CEO and founder of the Evertz Hydrotechnik (EHT)

Coolectro®PRO: Raising the standard for roll cooling

Thomas Rosenbauer is the CEO and founder of the Evertz Hydrotechnik (EHT), a German world leader in roll cooling systems, who has been designing and producing flexible and practical hydraulic water solutions for over 25 years. The high-performance valves and technically advanced systems of the EHT withstand the toughest conditions in 24/7 operation in hot and cold rolling mills of the metallurgical industry.



The EHT Coolectro®PRO

The aluminium industry is under increasing pressure to optimise energy use, minimise downtime, and elevate process control — all while facing high mechanical and thermal demands during the rolling process. Evertz Hydrotechnik's (EHT) latest generation of their cooling technology, **Coolectro®PRO**, directly addresses these challenges and sets a new benchmark, particularly with challenging, partly aggressive roll cooling media such as in modern hot rolling aluminium mills.

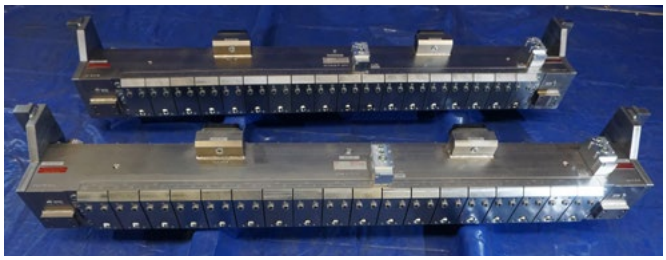
The system is not an untested newcomer. The development of the system started already back in 2017. Millions of cycles have been run on the EHT test field under the most extreme conditions. The EHT has challenged their **Coolectro®PRO** with heavy dirty, and aggressive emulsion, submerged it in emulsion and tested it for temperature, pressure and vibration as well, before approaching the industry with the system. Their efforts result in an unmatched reliability that nobody has seen before. Today, it's already field-proven in high-performance tandem mills producing advanced high-strength steels, **Coolectro®PRO** delivers unbeatable performance, precision, and sustainability - and is now fully ready to serve in other heavy dirty and aggressive media conditions, such as in aluminium hot

rolling mill applications.
On top of this, **Coolectro®PRO** has already proven itself in the aluminium industry. The pilot series has already been tested successfully in 2019 in Switzerland at a hot mill. The decisive proof of performance was provided by a long-term endurance test at the world-leading manufacturer of flat-rolled aluminium products in Germany:
Almost two years of operation, more than five million switching cycles and not a single failure. The system was operated with a full range of equipment, including pressure measurement, humidity indication, i-Con® plug and i-Jet® nozzles.

An electrical breakthrough — Without compressed air
Coolectro®PRO is a 100 per cent electrically driven, dynamically controlled spray valve system.
This approach, based on intelligent design, reduces energy consumption, simplifies infrastructure and ensures clean, reproducible operation – especially in the most difficult and challenging media conditions. At the same time, maintenance intervals are significantly extended.
Key performance features include:
- High-frequency control (up to 10 Hz) for fast, precise cooling adjustments
- No seals in the dynamic range, drastically reducing wear and service times
- Pulse Width Modulation (PWM) with only 25 per cent power required in holding mode
- Hermetically sealed solenoid for contamination resistance
- i-Con® plug connection for robust, maintenance-friendly installation
- patented i-Jet® nozzles for enhanced cooling efficiency and spray consistency

Proven performance: A reference from high-strength steel

In 2024, EHT successfully upgraded the selective cooling system of a 5-stand PLTCM tandem mill in North America, on behalf of the SMS group. The system operates under extremely high throughput and flatness demands. During the upgrade - which was completed during a 12-hour shutdown - the old, compressed air spray bars were replaced with **Coolectro®PRO**, resulting in a measurable improvement in reliability and cooling performance.
Since commissioning, the customer has reported:
- Zero spray valve failures
- Improved cooling uniformity, even with demanding



The EHT Spray bars DN16 PN10; EHSd Coolectro®PRO design

materials
- Simplified maintenance and reduced total cost of ownership
The successful modernisation impressed the operator to such an extent that **Coolectro®PRO** will already be implemented and put into operation in another new rolling mill this year. This reference underlines that the **Coolectro®PRO** technology is not only industrially tested but also proven – even under the toughest conditions in the steel industry.

A strong fit for the aluminium future
In aluminium rolling processes, surface quality, energy efficiency and the reliable control of complex spray media determine economic efficiency. **Coolectro®PRO** responds to these needs with a compact, modular design that:
- Integrates easily into 26mm and 52mm control zones
- Offers total flexibility for zone control and adaptation
- Suitable for new installations and for retrofitting existing systems. Whether for hot or cold rolling, **Coolectro®**PRO provides high-speed modulation, low maintenance burden, and clean operation without compressed air — a trio of benefits that align perfectly with the strategic goals of aluminium manufacturers.

Conclusion: Proven technology, the next aluminium standard?

With **Coolectro®PRO**, EHT is not just introducing another roll cooling system - it is setting new standards. Its proven success in the steel industry, combined with design principles tailored to modern aluminium operations, makes it the ideal platform for mills seeking to future-proof their cooling strategy. As energy costs, environmental targets, and product quality requirements increase, moving away from compressed air systems is not only logical – it is necessary. **Coolectro®PRO** is the advanced, purely electrical benchmark for roll cooling - engineered for performance, proven in production, and ready for the most aggressive spray media challenges of the aluminium industry.

WE KEEP YOUR FLATNESS IN SHAPE.

COOLECTRO®PRO

FOR HEAVY DUTY

- high performance spray valve
- no dynamic gaskets, no wear
- maintenance free
- perfect for PWM (Pulse Width Modulation)
- switching frequency up to 10 Hz
- purely electrical system / no compressed air required
- power consumption 8 W (with integrated power reduction)
- up to 130 l/min | 35 gal/min
- pitch ≥ 25mm | 1 inch

►►►

Thanks to the EHT modular system, we always create smart solutions for you. ROLL COOLING, DESCALING, ESD SELECTIVE DESCALING are just a few of our applications. Whether EHSd, EPSd or EPSr, we focus on your requirements and parameters. Different spray pressures and temperatures can be optimally adapted in our multi-chamber system.
In this way, every system receives the custom-made seal:

► COOLECTRO®PRO for heavy duty roll cooling applications
► HP²duraseal for descaling applications

EVERTZ HYDROTECHNIK

THE EVERTZ GROUP

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Alu Arabia in June at booth #J40
Alu China in July at booth #1E40
Alu Germany in October at booth #5F17

Contact us and let´s BRING OUT THE BEST.

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ENPOT
Aluminium's flexible future

Dr. Depree
Head of Technology at EnPot

"EnPot has been designed from the start to be retrofitted to existing smelters, and almost always on operating (live) pots for minimal process disruption," Dr. Depree, Head of Technology at EnPot.

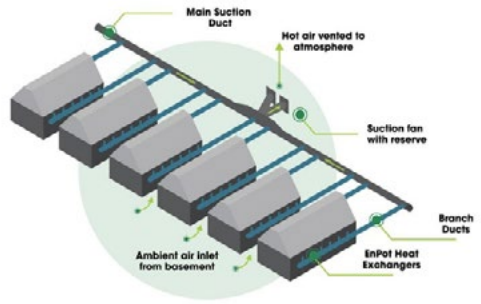
Head of Technology at EnPot, Dr. Depree leads system design, delivery, and ongoing development of the patented shell heat exchanger technology for aluminium smelters. He was instrumental in its development and demonstration, including commercial installation at Trimet Essen Smelter and more recent installations in China.
Previously, he spent over a decade at the Light Metals Research Centre at the University of Auckland, working at smelters around the world with leading experts including Prof. Mark P. Taylor.

AL Circle: Aluminium smelting has traditionally been viewed as a continuous, inflexible industrial process. How does EnPot challenge this long-held assumption, and what does 'flexible smelting' practically mean for plant operators?

Dr Depree: Smelting by its fundamental process design has always required steady energy input – the frozen bath ledge protecting the cell means the heat input and output must be continuously balanced to prevent cell freezing or meltdown (liquid tap out). So it's not a problem that can be solved by plant operators or changes in process control, as the modern cell designs developed continuously over 140 years of the industry have never allowed for control of heat losses to match changes in heat input. While energy was plentiful and cheap this was not a problem, however recent rapid changes in energy supply availability and price mean that existing hardware is no longer fit for purpose in this environment. EnPot involves a change in the smelting cell hardware to enable control of heat losses (both increased and decreased) so the cell can operate safely with more or less power input - now easily and

Figure 2

Technical EnPot Installation with 6-Pot Group



automatically controlled by smelter operators - within the range enabled by EnPot.

AL Circle: How do you see the concept of your technology positioning smelters as 'virtual batteries' for power grids reshaping the relationship between aluminium producers and energy markets?

Dr Depree: EnPot's first focus must be with the smelters - proving the technology is safe and enables power modulation of the cells within a certain range and time scale, as well as process control changes needed to optimise operations in this new regime of changing power. The exact needs of the power grid or market vary at every location, in the magnitude, duration and direction of change e.g. hourly, daily, or seasonal changes, either up or down, including full shutdowns. The way it works in practice is that once the power modulation window has been demonstrated to the smelter, the smelter and energy market then negotiate new power purchase agreements, that are often much more attractive for both parties. In any case it is clear that in future almost all power grids will require flexibility, and smelters can choose to benefit by being part of the solution.

AL Circle: As power accounts for a significant share of aluminium production costs, how can smelters use EnPot's solution to optimise energy procurement strategies, especially in volatile or deregulated electricity markets?

Dr Depree: Changes in power supply contracts could take multiple forms, including smelters participating directly in spot market trading, payments from grid operators for each realised modulation, long term supply agreements at favourable prices in return for certain grid regular or emergency responses, or consideration of transmission fees etc. The smelters in each case (of energy reduction) provide a valuable service to the grid, and must be compensated accordingly, to cover the retrofit costs and any operational costs or challenges involved in modulation. Additionally, they may take advantage of lower-priced power to temporarily increase capacity and produce metal at higher profit margins.

AL Circle: EnPot suggests that smelters can adjust electricity consumption by 20-30 per cent. What operational or technical barriers need to be addressed for widespread adoption of this capability?

Dr Depree: There are many aspects of process control that can be optimised at every smelter when power consumption changes. The pot heat balance can be easily controlled long-term by EnPot, but short-term changes in the cell need to be managed during this time lag i.e. operating cells temporarily in times of higher and lower superheat. Key aspects involve ensuring alumina feeding continues well at low superheat, as well as maintaining cell cover and anode integrity (and replacement rota) at high superheat and current density, as well as long-term management of cathode condition and cell lifespan. This is not a barrier to performing modulation, more an area to be optimised to achieve the best response to power modulation such that it can be used to the full potential enabled by the EnPot hardware.

AL Circle: As grids become increasingly dependent on intermittent renewable energy, how critical is demand-side flexibility from industries like aluminium in maintaining grid stability?

Dr Depree: EnPot has been discussing the commercial opportunities of power modulation since it was installed at Trimet Essen smelter in 2019, where the German grid was already highly renewable with variable pricing. Since that time, the rapid developments in power grids and the reduction in renewable generation costs have resulted in clear demands from power grid operators for smelters to become flexible users around the rest of the World also. If smelters do not become flexible, they will have to pay premium prices in future for base load power supply, making metal production unprofitable in many locations at times of lower metal price. The

power grids will continue to become more variable in future, and smelters will no longer be preferred customers, and may even struggle to secure power contracts without flexibility.

AL Circle: From a commercial standpoint, what kind of cost savings or revenue opportunities can smelters realistically unlock by participating in energy markets through flexible load management?

Dr Depree: EnPot has published energy market modelling for locations based on variable power prices for multiple energy markets, with different associated modulation requirements. In each case, the payback for a full potline retrofit ranged from nine months to four years based only on spot market prices without other payment from grid operators. Right now, the LME metal price is extremely high, giving even greater benefits to upwards modulations and capacity increases. A retrofit enabling a staightforward +10 per cent upwards increase in capacity can have a very short payback of under one year, without considering the other opportunities to capitalise on variable power pricing. It is also worth noting that power supply situations are changing rapidly around the world, and new revenue opportunities or supply risks are constantly being evaluated.

AL Circle: Retrofitting existing smelters is often more complex than building new ones. How scalable is EnPot's technology across the global fleet of aluminium smelters, particularly older facilities?

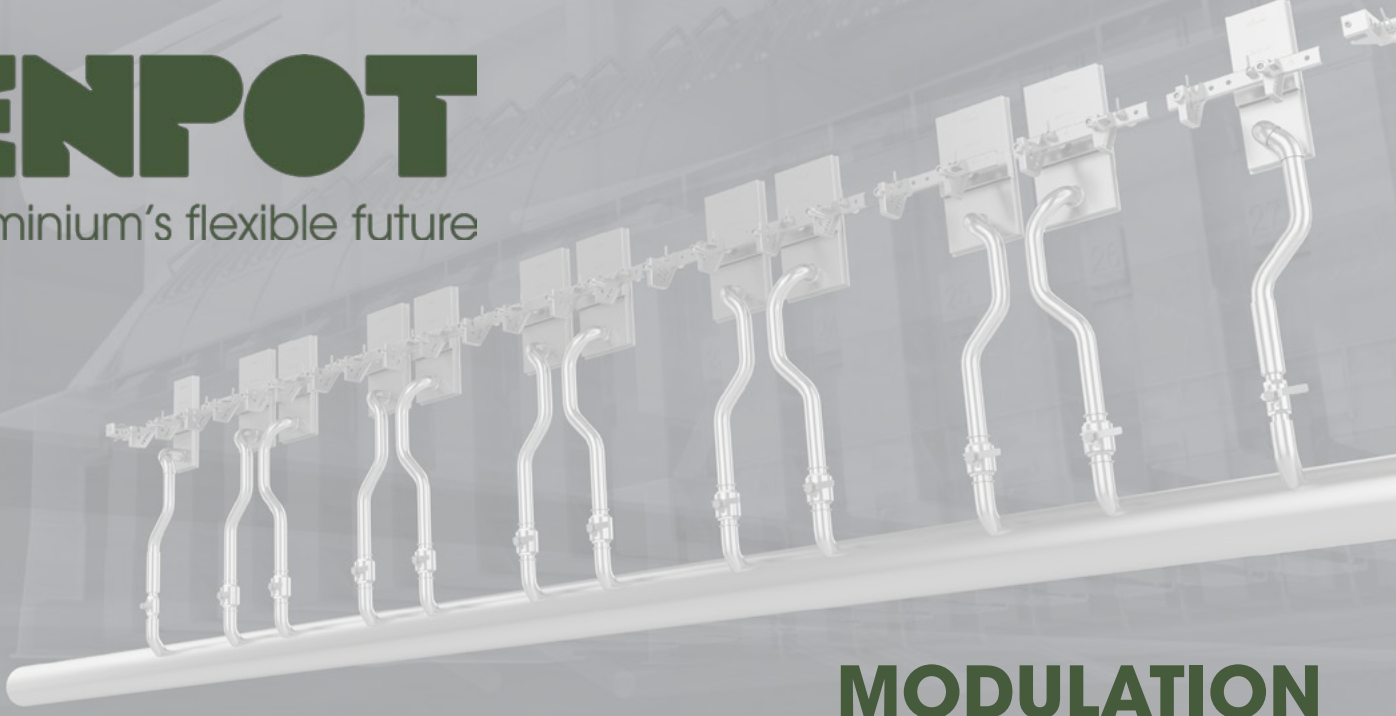
Dr Depree: EnPot has been designed from the start to be retrofitted to existing smelters, and almost always on operating (live) pots for minimal process disruption. Modern cell designs are remarkably similar and our core designs are easily adapted, however the oldest cells provide the most challenge for our custom-designed hardware of air distribution manifolds and suction piping. Some smaller cell designs have little available space around bus bars and support steel for ducting, and some smelters have excessive support steel as older cell designs were not optimised for high natural cooling, and less space is available for heat exchangers. In almost every case however the EnPot hardware can be adapted for suitable heat transfer performance and straightforward installation. It should also be noted that similar to metal production being more efficient in larger cells, EnPot installation is likely to be cheapest per production capacity on larger cells.

AL Circle: Geographical instability has interrupted global supply chains, how does the EnPot solution help smelters facing disruption of raw materials or logistics?

Dr Depree: EnPot gives smelters the ability to flex production up or down in response to power, supply constraints, or logistics disruption. During periods of supply chain disruption, this avoids all-or-nothing decisions by allowing operators to modulate production in line with factors outside their control. Whole potlines can be varied in production up or down, without the extremely costly decisions of stopping pots or potlines, and the associated technical, labour and safety challenges of restarting them later. This creates breathing space and increases resilience - protecting potline stability and avoiding costly shutdowns. Ultimately enabling smelters to better withstand and respond to volatility.

ENPOT

Aluminium's flexible future



MODULATION TECHNOLOGY FOR THE ALUMINIUM INDUSTRY

ENPOT TRANSFORMS SMELTERS INTO VIRTUAL BATTERIES...

Flex power usage

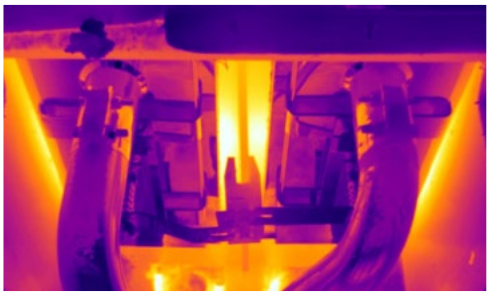
±20% instantly and ±30% with operational changes, to support seasonal demand, capacity increase, and extended emergency shortages.

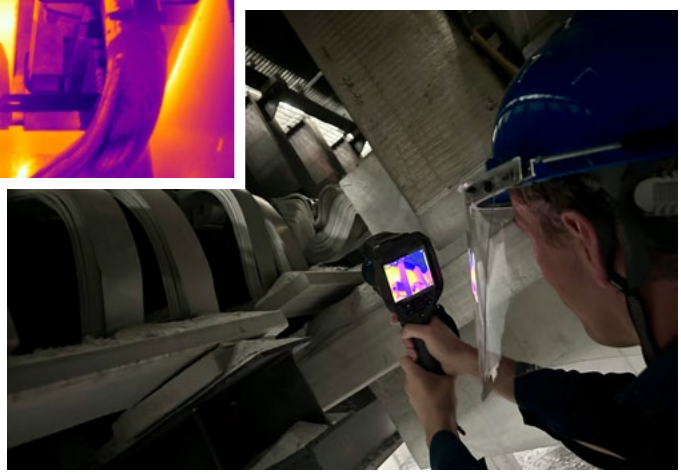
Support greener electricity grids

by operating like a virtual battery to provide demand side response to back up variable renewable energy.

Reduce CO_2 footprint & produce green aluminium

by using renewable energy with varying supply, such as wind and solar.





ENPOT

Aluminium's flexible future

Contact

technical@enpot.co.nz
www.enpot.com
www.enpot.cn

TOMORROW TECHNOLOGY
SYSTEMS AND EQUIPMENT FOR THE ALUMINIUM INDUSTRY

Giovanni Magarotto
CEO and managing partner of T.T. Tomorrow Technology S.p.A.

By 2026, we plan to integrate artificial intelligence into our control systems to predict and adjust melting parameters dynamically

Founded in 2000 by Giovanni Magarotto, who also serves as one of its managing partners, T.T. Tomorrow Technology is a northeastern Italy-based company specialising in the design and manufacture of customised equipment and special-purpose vehicles for the aluminium industry. With over 40 years of experience, he has worked across the chemical, mechanical, and aluminium industries, building deep technical and operational expertise.
T.T. Tomorrow Technology focuses on the design and production of Multifunctional Furnace Tending Vehicles, Automatic Charging Systems, Automatic Skimmers, and specialised transport solutions for solid aluminium handling. The company's solutions are developed to support critical casthouse processes such as furnace charging, cleaning, and skimming, with a clear focus on improving productivity and operational efficiency.

AL Circle: With Italy's aluminium market projected to grow from USD 4.17 billion in 2024 to USD 5.55 billion by 2030 at a 4.39 per cent CAGR, how is T.T. Tomorrow Technology positioned to tap into this growing market size with its special equipment range in 2026 and beyond?

Yes, of course, the Italian aluminium industry is entering a significant expansion phase on 2026 and beyond driven by the demand of these specific sectors:

- Automotive lightweighting;
- Sustainable packaging;
- Constructions and infrastructure;
- Aerospace, defense and navigation;
- Medical;
- Recycling trends.

T.T. Tomorrow Technology, as a world leader in specialised vehicles and equipment for the aluminium industry, is strategically positioned to capture this growth. Our company is not just a supplier but a "technological enabler", and our position for 2026 and beyond focuses on the following pillars:

- EGV and automation. A wide range of our special vehicles can now be supplied in EGV version, decreasing a lot the CO_2 generation and reducing the noise level inside the operational areas of the aluminium casthouses. These vehicles are increasingly integrated with Iot Sensor and data tracking devices, allowing the operators to work much more easily and safely than before.

- With energy prices remaining a great concern in Italy and Europe, our special vehicles help in reducing "door open" time for furnaces, significantly cutting the thermal and energy loss.

- Our special skimming 4WD turning and driving skimming vehicles are appreciated for their skimming and cleaning precision that is extending significantly the life of the refractory linings and lowering long-term CAPEX for producers.

- As the safety regulations become stricter, our automatic charging/skimming and cleaning equipment by means of their remote control on a Wi-Fi basis eliminates the need for the operator to be near the molten metal, drastically reducing workplace accidents.

AL Circle: The European aluminium industry is accelerating automation to improve efficiency and decarbonisation. How much of this is driven by solutions like T.T. Tomorrow's transport and furnace tending vehicles? What realistic performance improvements can be expected in 2026 based on current adoption trends?

The new EGV transport vehicle, designed for a net carrying capacity of 30 tonnes and currently under production, will mark a historic milestone for the aluminium sector. This vehicle will be the first step in a new range of electric foundry vehicles with an advanced level of automation. Thanks to the integration of artificial intelligence applications, we aim to offer to our clients a true technological leap towards the foundry of the future, characterised by highly automated processes and zero environmental impact.

AL Circle: Could you please tell us the growth prospect of aluminium casthouse in Europe and how do you plan to capitalise on the market? What new markets are you eyeing to penetrate in 2026 or over the next five years?

We believe that one of the next major challenges lies in the aluminium recycling sector, specifically in revitalising the metal through the meticulous recovery of various alloy grades. This process is increasingly supported by state-of-the-art metal separation technologies already available in the market. Such advancements will also greatly benefit the primary aluminium industry, enabling producers to focus on production cycles with a reduced environmental impact. As a result, there will be less emphasis on volume and greater attention to the quality of the metal produced, facilitating more sustainable and efficient manufacturing practices.

The aluminium casthouse industry in Europe is on a promising growth trajectory, driven by sustainability trends, automotive innovations, and infrastructure development. By investing in technology, focusing on recycling, and forming strategic partnerships,

we can effectively capitalise on these opportunities. Additionally, targeting emerging markets in Eastern Europe, MENA, APAC, and North America over the next five years will ensure diversified growth and a stronger global footprint.

AL Circle: With furnace operations accounting for a significant share of energy costs and the EU targeting a 55 per cent emissions reduction by 2030 alongside stricter regulations, how is your furnace equipment helping aluminium producers cut gas consumption and thermal losses while supporting decarbonisation without impacting productivity?

In recent years, we have focused our efforts on the engineering and development of new vehicles that deliver increasingly advanced operational precision and enhanced user-friendliness. Our design objectives are centred on technological innovation, seamless operator interaction, and optimised accuracy in critical industrial processes as follows:

- Precision Control Systems: Advanced automation and real-time monitoring ensure optimal furnace operation, maintaining consistent temperatures and throughput while minimising energy use.

- Faster Heat-Up Times: Our designs reduce cycle times with rapid heating capabilities, ensuring production targets are met without compromising on energy savings.

- Minimal Downtime: Modular designs and predictive maintenance features reduce downtime for repairs or upgrades, keeping productivity high even during transitions to greener technologies.

AL Circle: Italy relies heavily on secondary aluminium. How do your technologies support efficient scrap melting and metal recovery rates, and are there any advancement plans in 2026?

Italy's heavy reliance on secondary aluminium production, which involves recycling scrap to produce new aluminium, underscores the importance of efficient scrap melting and high metal recovery rates. We're excited to share how our vehicles and equipment technologies address these needs and outline our advancement plans for 2026. Here's a structured overview:

High-Efficiency Tending Operations: Our dedicated vehicles and special equipment are specifically designed for charging aluminium scrap, skimming and cleaning in a very fast and precise mode that optimises heat distribution for faster melting cycles, reducing energy consumption by up to 20 per cent.

Adaptive Temperature Control: Real-time monitoring and many automated controlled operations ensure consistent melting conditions, minimising overheating and oxidation losses during the processing of diverse scrap types.

Pre-Heating Systems: Our charging vehicles and automatic charging machines are integrated into the scrap pre-heating using waste heat from exhaust gases increases melting efficiency by up to 15 per cent, as the scrap enters the furnace at a higher initial temperature, reducing overall gas usage.

Advanced Dross Management: Our vehicles and robotic equipment are equipped with specialised stirring and skimming systems to separate dross (oxide impurities) effectively, improving metal recovery rates by up to 5-10 per cent compared to conventional systems.

Low-Oxidation Environment: By optimising the tending operations and minimising air exposure during melting, our technology reduces aluminium loss due to oxidation, ensuring more usable metal is recovered from each batch.

Energy Cost Reduction: Given Italy's high energy costs, our energy-efficient vehicle designs help producers lower operational expenses, making secondary aluminium production more competitive while adhering to strict EU environmental standards.

Sustainability Alignment: Our technologies reduce CO_2 emissions through lower gas consumption and compatibility with alternative EGV solutions, supporting Italy's alignment with EU decarbonisation goals (55 per cent emissions reduction by 2030).

Handling Diverse Scrap Streams: Italian producers often deal with varied scrap inputs (e.g., UBCs, turnings, and industrial waste). Our vehicle and equipment are engineered for flexibility, ensuring efficient processing regardless of scrap charging operations.

We're committed to continuous innovation to meet the evolving needs of the secondary aluminium industry. Here are our key development goals for 2026:

AI-Driven Process Optimisation: By 2026, we plan to integrate artificial intelligence into our vehicles and automatic charging and skimming machines control systems to predict and adjust melting parameters dynamically based on scrap composition, scrap weight, scrap alloy and other data aiming to further increase recovery rates by 3-5 per cent and reduce energy use by an additional 10 per cent.

Next-Generation Heat Recovery: The implementation of dedicated vehicles to support the subsidiaries phase of the melting operation will allow our customers to enhance heat recuperation and to capture and reuse up to 40 per cent of waste heat, significantly boosting energy efficiency for scrap melting processes.

Automated Scrap Analysis: We're investing in weighting technology to analyse scrap quantity in real-time before melting, allowing for automated adjustments to furnace settings to maximise recovery and minimise losses.

Circular Economy Integration: Plans are in place to collaborate with Italian recycling networks to design vehicles and equipment that integrate seamlessly with upstream scrap sorting and downstream alloying processes, enhancing overall circularity.

Customer Support: We provide dedicated technical support and training in Italy to ensure smooth adoption of our technologies, tailored to the unique challenges of the local market.

Our current technologies are already making a significant impact on scrap melting efficiency and metal recovery for Italy's secondary aluminium industry. With our ambitious plans for 2026/2027, we aim to push the boundaries of innovation further, helping producers achieve even greater sustainability and cost-effectiveness.

AL Circle: In this context, could you outline the share of secondary aluminium used in Europe and, particularly, in Italy, and how its consumption is distributed across key sectors?

I am pleased to provide an overview of the share of secondary aluminium used in Europe, with a specific focus on Italy, as well as its distribution across key sectors. Secondary aluminium refers to aluminium produced from recycled scrap, as opposed to primary aluminium.

Overall Usage: In Europe, secondary aluminium accounts for approximately 60 per cent of total aluminium production. This high share reflects the region's strong focus on recycling and sustainability, driven by EU policies promoting a circular economy and reducing carbon footprints.

Production Volume: According to the European Aluminium Association, Europe produces around 4.5-5 million tonnes of secondary aluminium annually, out of a total aluminium production of approximately 8-9 million tonnes.

Driving Factors: The prominence of secondary aluminium is supported by stringent environmental regulations, high energy costs for primary production, and abundant scrap availability from industrial and consumer sources.

Dominant Role: Italy is a leader in secondary aluminium

production within Europe.

Production Volume: Italy produces approximately 1.8-2 million tonnes of secondary aluminium per year, making it one of the largest secondary aluminium producers in Europe, supported by a robust scrap collection and recycling infrastructure.

Market Context: The country's focus on secondary production is driven by economic factors (lower costs compared to primary production) and environmental goals aligned with EU directives like the Circular Economy Action Plan.

Secondary aluminium is widely used across various industries due to its cost-effectiveness and sustainability benefits. Here's how consumption is distributed in Europe:

Automotive Sector: Approximately 40 per cent of secondary aluminium is used in the automotive industry for components like engine blocks, wheels, and body parts. The push for lightweight vehicles to improve fuel efficiency drives demand.

Construction and Building: Around 25 per cent goes to construction, used in window frames, roofing, and structural components, benefiting from aluminium's durability and recyclability. Packaging: About 15 per cent is utilised in packaging, particularly for beverage cans and foil, where recycled aluminium meets high demand due to short recycling loops.

Machinery and Equipment: Roughly 10 per cent is consumed in manufacturing machinery and industrial equipment, leveraging aluminium's strength-to-weight ratio.

Other Uses: The remaining 10 per cent covers sectors like consumer goods, electrical applications, and aerospace, where specific alloys from secondary aluminium are applied.

Italy's consumption patterns for secondary aluminium largely mirror Europe's but with some distinct emphases due to its industrial structure:

Automotive Sector: Around 45 per cent of secondary aluminium in Italy is used in automotive manufacturing, reflecting the country's strong automotive industry, including major manufacturers and suppliers producing lightweight components.

Construction and Building: Approximately 20 per cent is directed to construction, slightly lower than the European average, used in architectural elements and infrastructure projects.

Packaging: About 15 per cent supports the packaging industry, particularly for food and beverage containers, driven by Italy's significant food export market.

Machinery and Industrial Applications: Roughly 15 per cent is used in machinery and equipment production, supporting Italy's mechanical engineering sector.

Other Uses: The remaining 5 per cent includes niche applications in furniture design, consumer electronics, and other smaller industries.

AL Circle: As tariffs raise costs across the aluminium value chain, how are they impacting your customers' capital spending on automation and equipment—are projects being delayed, downsized, or reprioritised toward efficiency gains, and what are your future plans in response?

Tariffs on aluminium and related materials are indeed increasing costs across the value chain, affecting raw material prices, production expenses, and end-product competitiveness. We're committed to understanding and addressing how these challenges impact our customers' capital spending on automation and equipment. Below, we outline the observed trends and our future plans to support aluminium producers during this period.

Tariffs, such as those imposed by the EU on aluminium imports or retaliatory measures in global trade, have created a ripple effect on operational and investment decisions for aluminium producers. Based on feedback from our customers and industry insights, here are the key trends:

Delayed Projects:

Many customers are postponing large-scale capital investments in new furnace installations or plant expansions due to heightened financial uncertainty. Tariffs have increased input costs (e.g., scrap or primary aluminium), squeezing profit margins and leading to a cautious approach.

For instance, some European producers have delayed planned upgrades by 6-12 months, awaiting clarity on trade policies and cost stabilisation.

Downsized Initiatives:

Budget constraints caused by higher costs are leading to scaled-back projects. Instead of comprehensive overhauls, customers are opting for smaller, phased implementations of automation or equipment upgrades to manage cash flow.

An Italian secondary aluminium producer, for example, reduced the scope of a planned automation project by 30 per cent, focusing only on critical components to minimise upfront costs.

Reprioritisation Toward Efficiency Gains:

There's a noticeable shift toward investments that promise immediate cost savings and operational efficiency. Projects focusing on energy-efficient furnaces, heat recovery systems, and automation for reduced labour costs are being prioritised over capacity expansion.

Customers report a preference for retrofitting existing equipment with new ecological engines and replacing the control systems, as these upgrades offer quicker ROI amidst tariff-driven cost pressures.

To help our customers navigate these challenges, we've adapted our offerings and engagement models to align with their shifting priorities:

Flexible Financing Options: We're offering deferred payment plans and leasing options for our vehicles, equipment and automation systems to ease the burden of upfront capital costs, allowing projects to proceed despite budget constraints.

Focus on Efficiency Solutions: We're emphasising

modular, retrofit-friendly technologies that deliver immediate energy savings and lower operating costs, aligning with the trend toward efficiency-focused investments.

Phased Implementation Support: For downsized or delayed projects, we provide scalable solutions that can be implemented in stages, ensuring customers can start with critical upgrades and expand later as financial conditions improve.

Consultative Approach: Our team works closely with customers to reassess project timelines and priorities, offering tailored recommendations to maximise ROI under current market conditions.

AL Circle: With the European Union considering restrictions on aluminium scrap exports, aluminium scrap availability is likely to grow in the market. How do you see this shift impacting the demand for secondary aluminium solutions for T.T. Tomorrow in 2026 and beyond?

The European Union's potential restrictions on aluminium scrap exports are poised to increase scrap availability within the region, as less material will leave the EU market. This shift is expected to have significant implications for the secondary aluminium industry, particularly for companies like T.T. Tomorrow Technology.

Impact on Demand for Secondary Aluminium Solutions

Higher Demand for Melting and Processing Vehicles and Equipment:

With more scrap available, producers will need to scale up melting capacities to handle larger volumes. We anticipate a 15-25 per cent increase in demand for high-efficiency dedicated vehicles and equipment tailored for scrap processing by 2026/2027, as companies like T.T. Tomorrow seek to capitalise on cost-effective raw materials.

Focus on Metal Recovery Technologies:

Greater scrap volumes often include varied quality and contamination levels. This will drive demand for advanced dross management and slag separation systems, projecting a 20-25 per cent rise in adoption of recovery-focused solutions to ensure high metal yield.

T.T. Tomorrow can leverage our stirring and low-oxidation technologies to improve recovery rates by up to 10 per cent, turning surplus scrap into higher profits.

Automation and Process Optimisation Needs:

Handling increased scrap volumes efficiently will necessitate automation to reduce labour costs and improve consistency. We foresee a 25-30 per cent growth in demand for EGV and AI-driven control systems and real-time monitoring solutions by 2026, aligning with our planned advancements in this area.

These solutions will help T.T. Tomorrow streamline operations, ensuring scalability as scrap availability grows.

Sustainability-Driven Investments:

The EU's push for a circular economy, coupled with scrap export restrictions, will encourage producers to invest in green technologies. Demand for EGV could rise by 15-20 per cent by 2026/2027, supporting decarbonisation while processing larger scrap quantities.

Our future-ready designs will position T.T. Tomorrow to meet both production and environmental goals under stricter EU regulations.

Your **Technology** for today & **Tomorrow.**

We are aware not all customer needs are the same, thus customisation has become the key element of our success. We design tailored vehicles and equipment, offering a wide range of personalized solutions, to ensure their maximum performance and reliable operations.

TOMORROW TECHNOLOGY

SYSTEMS AND EQUIPMENT FOR THE ALUMINIUM INDUSTRY

T.T. Tomorrow Technology S.p.A.

35020 Due Carrare - Padova - **Italy** - Via dell'Artigianato 18
T +39 049 9128800 - mailbox@tomorrowtechnology.it

Designed & Manufactured in Italy

EPIQ MACHINERIE / MACHINERY

Éloïse Harvey
CEO, EPIQ Machinery

EPIQ shaping what comes next: safer, more efficient, and more sustainable operations

Éloïse Harvey, CEO, EPIQ Machinery, is an engineer and entrepreneur who has led the company since 2021. This international firm produces material handling equipment and solutions for heavy industry, combining automation, robotics, and digitalisation. In recent years, under her leadership, the EPIQ group has actively diversified its sectors and geographic markets. She also chairs the board of directors of AluQuébec and serves on the boards of several other organisations.

AL Circle: Global aluminium consumption has crossed the 100-million-tonne mark and is expected to surpass 107 million tonnes in the near term. Against this backdrop of rising demand, are aluminium producers accelerating investments in advanced machinery to automate and optimise aluminium manufacturing processes? From your perspective, what has been the growth rate of machinery adoption in casthouses so far, and how do you see this trend shaping up by 2026?

Éloïse Harvey: Yes, we are clearly seeing acceleration. The casthouse is where producers can differentiate the most. It is both energy-intensive and highly exposed to safety risks, making it a natural focus for continuous optimisation.

In that context, we are observing increasing demand for solutions such as the MECFOR Smart Casthouse Solution and AD-branded automated billet handling, sawing, and packing systems. More broadly, automation adoption continues to grow steadily,

with a strong acceleration expected through 2026 as producers seek to improve performance, safety, and operational consistency.

AL Circle: With each passing year, decarbonisation is becoming central to primary aluminium producers worldwide. How does EPIQ machinery's technology reduce carbon emissions across aluminium smelting and casting processes?

Éloïse Harvey: At EPIQ, we believe that meaningful carbon reduction can be achieved by leveraging proven, economically viable technologies. Through energy optimisation, enhanced process control, and smarter equipment, we help our clients reduce energy intensity, minimise waste, and switch from reactive to predictive operations. These are concrete, scalable levers for reducing emissions across an aluminium smelter. At the same time, we are actively working with the industry to prepare for the next phase. We are currently leading a broad initiative to assess the adoption potential of specialised mobile equipment powered by electric drivetrains. This effort goes beyond technology; it is about understanding real-world operational constraints across regions, from infrastructure and duty cycles to maintenance capabilities. Our goal is to ensure that electrification strategies are not only ambitious but truly deployable.

Looking ahead, our priority is clear: to accelerate the deployment of energy-efficient and electrified solutions, enabling aluminium producers to achieve tangible and lasting reductions in their carbon footprint, step by step, operation by operation.

AL Circle: Anode efficiency remains critical to lowering the overall carbon intensity of aluminium production. How is the industry responding to EPIQ Machinery's Anode Handling and Cleaning System, which integrates the Green Anode Plant, Bake Furnace, and rodding shop while enabling buffered storage across process stages? What level of demand do you anticipate for this solution in 2026 and the years beyond?

Éloïse Harvey: The industry has responded positively to integrated anode handling solutions, particularly as producers continue to push for greater efficiency in their aluminium production within existing assets.

One of the key drivers is the increase in amperage in potrooms, allowing more metal to be produced within the same plant footprint. However, this evolution puts pressure on existing infrastructure, which was not originally designed to support the reduced cycle times required for anode changing or larger anode blocks.

This is where our expertise comes into play. We work with our customers to upgrade their existing equipment so it can meet these new operational requirements in a cost-effective and reliable way.

We have been delivering these types of projects since 2012 and continue to see steady demand, with several projects underway and a solid pipeline ahead.

AL Circle: Asia (outside China) is growing as an important hub for aluminium production, especially primary. How would you assess EPIQ Machinery's current footprint in these markets, and what strategies are you pursuing to strengthen your presence through products, services, or partnerships in the region (Asia)?

Éloïse Harvey: Outside China, India represents a significant share of primary aluminium production in Asia. EPIQ has been established in India since 2014. Today, EPIQ relies on more than 500 employees across four business units, allowing us to serve all major Indian primary aluminium producers.

Our strategy is to continue growing alongside our customers by strengthening our local capabilities while leveraging our global expertise. This approach enables us to adapt our solutions to the specific operational realities of each market and to build long-term partnerships that support both performance and sustainability objectives.

AL Circle: As secondary aluminium production gains momentum to meet global demand and sustainability goals, is EPIQ Machinery working on new solutions to enhance sorting efficiency and recycling performance? Can we expect the launch of new machinery tailored specifically for secondary aluminium producers?

Éloïse Harvey: Yes, EPIQ is working on multiple fronts to help secondary producers improve efficiency. Unlike primary producers, whose profits are closely tied to energy costs and the LME, secondary producers' profitability depends largely on operational efficiency, since the price of scrap (input) and the price of saleable secondary aluminium (output) tend to move together.

Through our value engineering programmes, we are focused on reducing the capital cost of billet handling, sawing, and packing systems for secondary extrusion billet producers while maintaining our high standards in

automation, reliability, and performance.

At the same time, we continue to advance casthouse operations through integrated solutions, including Smart Casthouse Solution, a multifunction furnace charging and tending vehicle coupled with task-specific tools, digital solutions for production and maintenance planning, automated vehicles to enhance safety and reduce labour dependency, and advanced analytic tools to support performance, decision-making and continuous improvement.

AL Circle: What major challenges do you foresee for aluminium producers over the next decade, and how can machinery providers help address them?

Éloïse Harvey: Over the next decade, aluminium producers will face a combination of structural challenges that will require both operational excellence and technological transformation.

First, decarbonisation will remain one of the most defining pressures on industry.

Aluminium producers are under increasing pressure to reduce emissions from smelting, anode production, and logistics. Machinery providers can play a key role by designing equipment that is more energy-efficient (electrical), optimised for process stability, and compatible with emerging technologies, such as inert anodes and advanced recycling systems.

Second, labour availability and workforce safety will become increasingly critical.

Many smelters are struggling to recruit and retain skilled workers, while safety expectations continue to rise. Automation, robotics, and autonomous mobile equipment can significantly reduce exposure to hazardous tasks while also helping plants maintain productivity with smaller teams.

Third, operational reliability and cost competitiveness will be essential.

Energy costs, geopolitical uncertainty, and supply chain disruptions mean producers must operate their plants with greater precision than ever before. This is where digitalisation becomes a powerful lever. By integrating machinery with plant-wide data platforms, producers can gain real-time visibility of equipment performance, predictive maintenance needs, and process optimisation opportunities. Finally, the industry will increasingly require integrated solutions rather than standalone machines.

Producers are looking for partners who understand the full ecosystem of a smelter and can deliver interconnected systems combining equipment, robotics, digital platforms, and lifecycle services to support long-term performance. In that context, the role of machinery providers is evolving. We are no longer simply equipment manufacturers; we are becoming technology partners helping producers build safer, more efficient, and more sustainable operations for the future.

Smarter operations. Lower impact. Stronger performance where it matters most.

We deliver valuable improvements across your operations.

Shaping what's next. This is EPIQ

AD BROCHOT MECFOR FAFECO

ADF ENGINEERING EPIQ DIGITAL EPIQ STYMER NOVIMEQ AUTOMATION

Scan to connect with our experts →

www.epiqmachinery.com

Aluminium Association of Canada

Jean Simard
President and CEO of Aluminium Association of Canada

Current market conditions are incentivising Canadian aluminium flows toward the US market despite the tariff

Jean Simard, President and CEO of Aluminium Association of Canada and the official representative of Canada's aluminium industry, serves as a leading voice with governments, business associations, NGOs, media and international organisations connected to the sector. Recipient of the King Charles III Coronation Medal for advancing Canada's green aluminium and his commitment to the arts, Simard brings deep expertise in geopolitical trade analysis, public policy, sustainability, environment, and energy.

AL Circle: With nearly 3 million tonnes of annual production (as of 2025) and contributing 4.47 per cent to the global output, what responsibility do you see to come to Canada after the recent crisis supply chain crisis due to the closure of the Strait of Hormuz?

Jean Simard: Canada produces more than 3.2 million tonnes annually . It is not so much a question of responsibility, but rather of market fundamentals. Recent supply chain disruptions have reinforced the reality that there is no readily scalable alternative to what Canada provides as a supplier of primary aluminium to US and even European consumers.

Canada holds a uniquely advantageous position with a geographically secure and stable supply base in a stable democracy, deeply integrated supply chains with the US, and a role that complements rather than competes with domestic US production. This is further supported by strong and reliable energy fundamentals, as well as production operated by globally established players such as Alcoa, Alouette and Rio Tinto. The Middle-East situation only exacerbates an already highly disrupted market due to high tariff going into the U.S., which now needs metal more than ever.

AL Circle: Owing to the US tariffs on aluminium,

Canada's beer industry is still grappling with the expensive packaging cost. Report says missing domestic manufacturing capacity for certain widely used beer can formats is the hindrance caused to the breweries. As an aluminium association of Canada, what initiatives are you taking to help them overcome this crisis?

Jean Simard: The AAC is focused on providing them with the right business environment and market access to primary aluminium. The association is also working on enabling producers to focus on what they do best: producing aluminium that can then be transformed to fill market needs. It thus becomes a numbers game, it's all about critical mass and volume and the extent to which there is a business case for the required industrial capacity downstream. A Canadian rolling mill has long been discussed, but the key constraint has been the lack of critical mass of demand, along with competitiveness challenges relative to larger, more scalable US facilities. If the Canadian business environment evolves to support additional rolling capacity, it will be left to rolling mill operators to decide if they see opportunity.

AL Circle: With the United States' 50 per cent tariff still in place on Canadian aluminium imports, how do you foresee the trade flow from Canada to the US in 2026? Already in 2025, there was a dip in exports to the US, so do you look for alternative markets for the shipment?

Jean Simard: Current market conditions, including the Iran conflict and elevated premiums, have started to incentivise Canadian aluminium flows toward the US market despite the tariff. Volumes directed to the EU in 2025 are not all tied to long-term contracts, meaning reorientation remains possible in 2026 depending on relative market conditions. Over time, producers will allocate volumes based on profit and netbacks whether through long-term VAP contracts or commodity sales. Markets are constantly evolving; if the EU becomes more attractive again in the coming months, flows will adjust accordingly.

AL Circle: Canada is prioritising its domestic aluminium industry by implementing 'Buy Canadian' procurement policies to support local producers against trade disruptions. Similarly, many other countries are taking the same approach. Going ahead, how the global demand of primary aluminium be met, especially in those countries/regions where primary aluminium production has lower volume.

Jean Simard: "Buy-local procurement" policies are generally aligned with existing market capacity, helping to support/incentivise local production where it already exists. They can strengthen supply chain resilience, but operations must remain competitive in the broader market to be sustainable. Again it's a numbers game, with a population of 40 million people, Canada only consumes about 10 per cent of its primary production, this will not move the needle for us but might help transformers who are getting hit back and forth by tariffs. In a commodity market, meeting demand (especially in regions with limited primary production) will continue to rely on trade flows from competitive, surplus-producing regions. Adding or maintaining non-competitive capacity requires more than procurement policies alone; it depends on a supportive business environment, access to competitive energy, and long-term market fundamentals.

AL Circle: As the world is grappling with oil, gas, and energy crisis, how do you think this will affect Canadian primary aluminium smelters in 2026?

Jean Simard: For smelters, this crisis will create pressure either from upstream or downstream. Fortunately, upstream capacity has not been directly impacted so far. Indirect pressure could emerge through higher input costs and tighter global supply dynamics. Downstream pressure could be more significant. An energy crisis is never positive for the economy, even for regions like North America that are well supplied. Aluminium remains a globally traded commodity driven by international market conditions. If the situation persists, higher energy costs will affect everything, from consumer purchasing power to manufacturing operating costs, ultimately weighing on demand and margins.

AL Circle: Canadian Energy Metals Corp. has released a PEA highlighting the potential of Canada's first major domestic alumina resource. Given the scale of Canada's aluminium industry and its dependence on imported alumina, how realistically can this project address the country's alumina supply requirements?

Jean Simard: It is difficult to see how this potential supply could be competitive with existing alumina sources currently used by Canadian producers. The alumina percentage would need to be competitive with traditional bauxite deposits typically containing 40 to 60 per cent alumina. The CEM project is a polymetallic deposit with a concentration of alumina, a more complex mineral assembly possibly requiring a more elaborate extraction process. The reserves of global

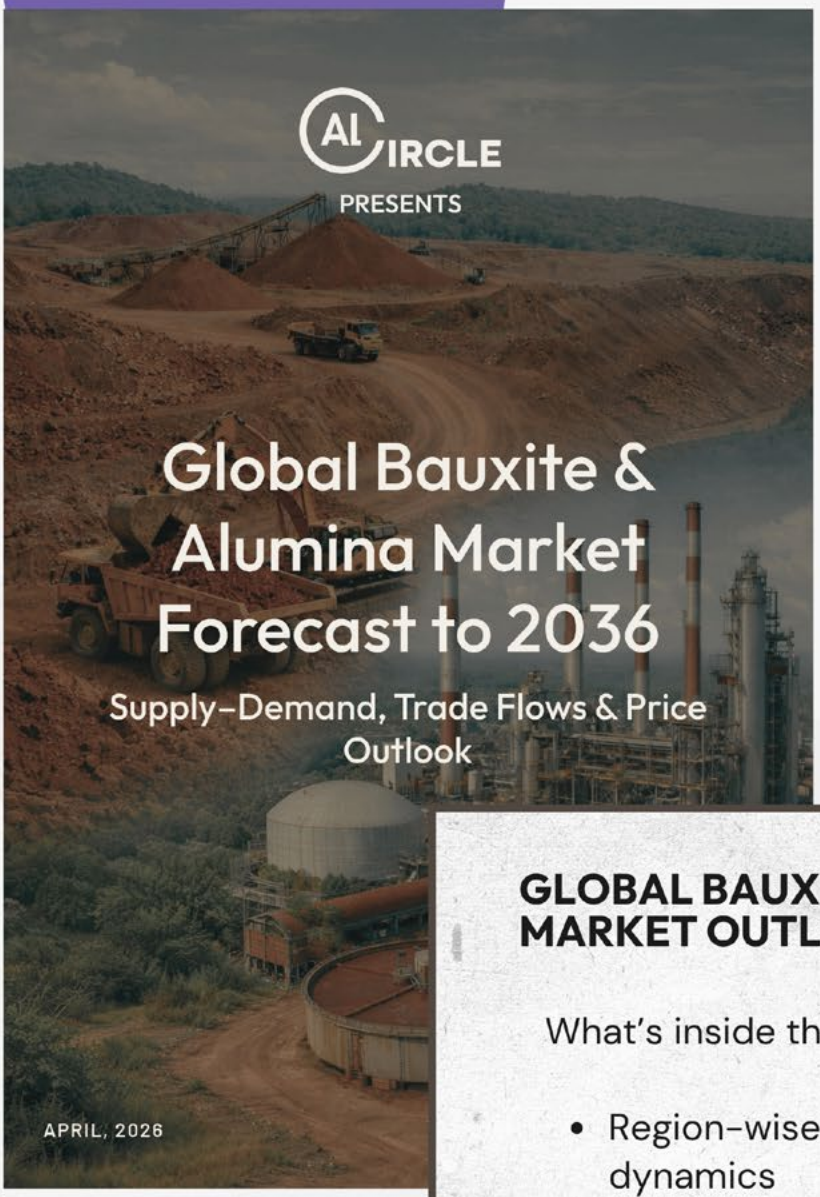
bauxite are super high at 32 billion tons considered economically exploitable.

AL Circle: How much aluminium demand growth do you expect in Canada over the next five years? Do you anticipate to meeting the majority of the demand with domestic production?

Jean Simard: Canada consumes approximately 300,000 tonnes of primary aluminium. Under normal circumstances, Canadian production, 3.2 million tonnes, can fully meet domestic demand, provided consumers are willing to pay market-based, competitive prices.

That said, there is clear upside potential driven by increased military spending, local procurement initiatives, potential new automotive investments, and electrification trends. For precise forecasts, we rely on specialiaed market intelligence firms and their economic models. CRU puts it roughly at 2 per cent per year.

UPCOMING REPORT



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PRE-BOOK NOW

GLOBAL BAUXITE & ALUMINA MARKET OUTLOOK: 2026-2036

What's inside the report?

- Region-wise supply & demand dynamics
- Metallurgical vs non-metallurgical bauxite segmentation
- Smelter-grade vs speciality alumina markets
- Trade flow segmentation by exporting & importing corridors
- Price segmentation across FOB benchmarks & index-linked mechanisms
- China & other major bauxite-alumina supply market analysis

.. and more!

DYNAMIC CONCEPT

Patrice Côté
President of Dynamic Concept

Facing structural challenges in the aluminium industry: How to create the future today

Patrice Côté, President of Dynamic Concept, is a passionate and dedicated entrepreneur known for his strong leadership, technical expertise, and ability to drive business growth. With over 30 years of experience in aluminium production and transformation processes, he founded Dynamic Concept in 2004 in Canada after gaining solid project experience in aluminium casting. Under his leadership, the company has evolved from a specialised service provider into a global leader in advanced automated technologies for the aluminium industry. He expanded the business internationally with the launch of Dynamic Concept Europe in 2021, followed by Dynamic Concept USA. Deeply involved in the industry, he also served on the board of AluQuébec from 2017 to 2024 and is an associate member of the Aluminum Association.

The aluminium industry is entering a new era. The demand for aluminium continues to rise across transportation, electrification, packaging, construction and recycling-driven markets. At the same time, aluminium producers face a set of structural challenges that are fundamentally reshaping casthouse operations worldwide.

Workforce shortages, ageing industrial assets, decarbonisation and recycling targets, growing expectations for higher added-value metal, productivity pressure and digital transformation are no longer isolated issues. Together, they define the operating environment in which today's casthouses must perform.

As an equipment supplier working closely with aluminium producers around the world, Dynamic Concept sees first-hand how these challenges translate into daily operational decisions. Addressing

them successfully requires robust, reliable, and technologically advanced equipment capable of delivering measurable results in real industrial conditions.

Workforce Shortage and Operational Challenges

Dynamic Concept supplies robotic and automated equipment specifically designed for molten-metal environments. Solutions such as DYNASKIM C and DynaSkim S remove operators from direct exposure during skimming, sampling and metal treatment operations. ARFT – Automated Robotic Furnace Tending automates repetitive and hazardous furnace tasks, while DYNAFEED eliminates crane-dependent and labour-intensive operations.

Decarbonisation and Recycling

Dynamic Concept addresses decarbonisation and recycling challenges through equipment that improves metal recovery and energy efficiency. DYNAHEAT, a high-performance preheating furnace for scrap and alloy, reduces overall energy consumption during melting, while DYNAPURE supports cleaner metal production by removing inclusions and impurities—especially critical when increasing recycled content.

Modernise, Automate and Robotise Existing Casthouses

Dynamic Concept supplies equipment engineered for integration into existing casthouse layouts, enabling progressive modernisation without disrupting production. Furnace retrofitting solutions, robotic mould maintenance stations and automated metal transfer systems support both brownfield upgrades and greenfield projects.

Higher Added-Value Metal

To support premium aluminium applications, Dynamic Concept provides advanced quality-focused equipment. DYNAPRIME, a patented high-cleanliness filtration system, improves metal quality, while DYNAPURE and the Automated Handfree Vertical Casting Machine (VDC) ensure consistent, repeatable casting conditions.

Productivity

Productivity gains depend on operational stability. Automated metal transfer systems, intelligent furnace equipment and robotics supplied by Dynamic Concept improve uptime, reduce losses and deliver sustainable cost-per-ton improvements.

Digital Transformation

Digital intelligence is embedded directly into Dynamic Concept equipment. SERMA, the patented Full Volume Anode Internal Scanning System, and Full as Cast Slab UT provide advanced inspection and quality data, supporting both real-time decisions and long-term process optimisation.

Creating the Future Today

The casthouse of the future will not be defined by a single technology but by the intelligent integration of advanced equipment that improves safety, productivity, quality and sustainability. By supplying practical and reliable technological solutions for both existing and new casthouses, Dynamic Concept helps aluminium producers build a resilient and competitive future.

Creating your future today.

DYNAMIC CONCEPT

Transforming molten metal with innovative solutions and technologies.

Creating your future today.

Dynamic Concept is a leader in automated and robotic industrial process technologies, recognized worldwide for its expertise and its innovative equipment and solutions for aluminum casting and processing.

Dynamic Concept supply technologies and solutions to:

1. Produce high added-value aluminum products focused on growing and durable markets
2. Increase recycling and efficiency while reducing carbon footprint
3. Automate, robotize and numerize operations to optimize performance, respond to the evolving workforce and increase safety at operation

CANADA
Saguenay, QC

EUROPE
Décines-Charpieu, Lyon

USA
Nashville, TN

AL BIZ

Top Suppliers of LeaderSpeak 2026

Chiripal Poly Films ltd

Manufacturer of Aluminium foil

Krishnam Resources Pvt Ltd

Trader of aluminium ingot A9

Auto Die Cast (India)

Manufacturer of Aluminium Die Casting Components

Ralco Extrusion Pvt. Ltd.

Manufacturer Extrusion of Aluminium Curtain Wall, Window and Architectural Profile

Thermtech Engineering

Manufacturer of Industrial Furnaces and Heating System

Tuticorin Bio Energy

Manufacturer of Aluminium Alloy Ingot and Magnesium Alloy Ingot

John Courtenay
Co-Director at ACT

Casthouses can increase production by at least 17 per cent without building a new furnace

John Courtenay, Co-Director at ACT, is a leading specialist in high-efficiency fluxes, launder coatings, and furnace optimisation technologies. He studied metallurgy at Aston University, earning a BSc (Hons) and began his career at Foseco International in 1968, progressing through the ONC, HNC, and LIM qualifications. He is the chairman and CEO of MQP International Ltd., specialising in grain refinement products for aluminium alloys. His company developed Optifine, a high-efficiency grain refiner that significantly reduces addition rates and improves metal quality. Over the years, he has held international technical and marketing roles across the UK, Canada and Japan, including serving as general manager of the steel mills division at Foseco Japan.

AL Circle: Like we saw last year, the rise in the primary aluminium benchmark price due to supply chain disruptions following US tariff implementations resulted in improved earnings for many companies. If the same situation unfolds in 2026, do you then see a positive buying sentiment of casthouse technologies in 2026?

John Courtenay: When imports are heavily penalised, they quickly become uncompetitive, and this creates serious difficulties for suppliers like us, who simply cannot price products competitively. There is also supply chain disruption.

One of the key issues for us is that tariffs imposed on materials and products from China have been particularly severe. Our manufacturing strategy for our Refinal range of high-performance, environmentally friendly fluxes started with European manufacture, but as environmental requirements placed on manufacturing became more stringent, resulting in ever higher costs, we moved manufacturing to the Far

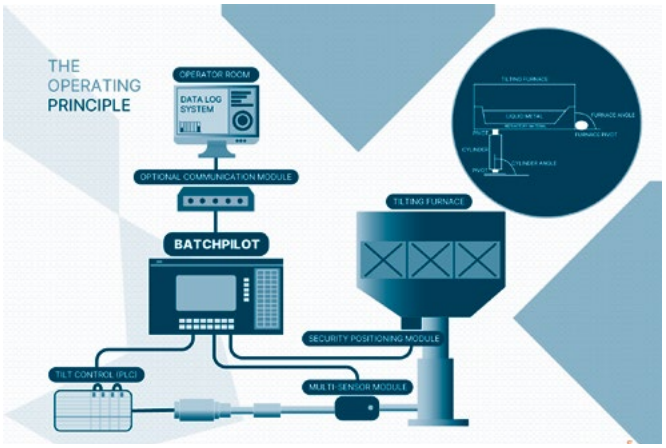
East, starting with India, then China. This enabled us to achieve much better quality control.
The steep tariffs—up to 70 per cent in some cases—are resulting in a dramatic reduction in what we are able to supply for the US market compared with previous years. This ultimately means that our new developments and advanced technologies are unlikely to reach the US market, which will not help customers who are making high-end products.
There have also been attacks by Iran on freight travelling through the Strait of Hormuz, which have led to higher costs and longer supply times via extended routes for many. However, on a positive note, the US tariffs have forced us to shift our focus toward markets that are not subject to harsh restrictions, for example, Brazil, South America and the Far East, which resulted in significant growth for us.
We also have effective countermeasures to the freight issues, including global stocking facilities to limit the effect of volatility when transporting freight.

AL Circle: According to Hydro Aluminium Rolled Products study, flux treatments with the RFI impeller system generate 50-70 per cent less dross than alternate flux addition methods. What economic and operational benefits does it extend to casthouses?

John Courtenay: Since the 1990s, fused refining fluxes have been in widespread use as a means of reducing sodium in the melt and cleaning liquid aluminium. Traditional practice was to inject chlorine gas into melting or holding furnaces, reducing hydrogen and alkali metals, as well as metallic and non-metallic inclusions.
However, in shallow furnaces, this created large bubbles and low residence time, resulting in acid gas and toxic particulates, presenting major health and safety concerns. Our Refinal fused fluxes give casthouses an environmentally friendly alternative and a host of other advantages.
The beauty is that casthouses no longer have to throw the flux into the furnace or submerge it on a forklift; they can use the RFI impeller system, which is the bee's knees of casthouse equipment. While we have no direct involvement with selling RFIs, we always recommend customers buy one independently to get the most out of our flux treatments and put customers in touch with STAS, one of our partner suppliers. In fact, our Refinal fluxes were designed to work in tandem with the RFI system and have the absolute right granulometry for the system to work at its best.
Our newest product, Refinal HAL F7, is one example; it removes very fine oxide particles below 12 microns in size from the melt, unlike many fluxes that can only remove larger particles over 15 microns. These highly damaging oxides are commonly found in light scrap used in remelts, which is where the industry is going, and if not removed, they can lead to blocked filters and aborted casts.

AL Circle: Amidst the ongoing battle between demand and supply in the aluminium industry, how well do the technology providers position themselves? What tips would you like to share with your industry peers in 2026 during the present volatile market?

John Courtenay: The good news is that we are seeing renewed economic growth for producers outside China because of the governmental cap on aluminium production there, which, not too long ago, produced half the world's aluminium.
However, the rest of the world must move faster to meet the increased demand for aluminium, which is essential for achieving net zero. Our BatchPilot furnace weighing system offers this opportunity, as it has a huge impact on the speed of production. In fact, casthouses can increase production by at least 17 per cent without building a new furnace due to the increase in 'right first time' batching.
BatchPilot, which is totally unique in the industry, was developed as a result of us identifying that casthouses were not able to accurately measure furnace weights. Why was this a problem? For one, in a typical casthouse, the furnace cycle time is four hours, but you can lose several hours making analysis corrections because of the inaccurate batching due to the inaccurate heel weight. This can result in the loss of an average of 15 to 20 hours a week, equivalent to two or three charges per week.
In 2006, the first BatchPilot units were installed successfully at Aleris Duffel in the Netherlands and are in daily use today. In 2008, a project was initiated to optimise the number and sizes of slabs produced to increase production capacity at Alunorf in Germany, where the most serious issue was the number of short casts being produced – 600 per month out of 1,500. Operators had to rely on visual assessment of the weight of the furnace, which gave an error of >+/- 2 tonnes and led to short slabs.
Alunorf went on to install 11 BatchPilots, one for each casting pit, ensuring that there was no production lost, resulting in a significant increase in production, and the incidence of short slabs was reduced to below 1 per cent. This innovation has transformed casthouse



operations on a global scale.

AL Circle: With the escalating energy crisis in Europe, how are ACT's technologies helping casthouses reduce electricity consumption during production processes? Do you plan to integrate new features into the present technologies to strengthen their performance while consuming less energy?

John Courtenay: Because BatchPilot increases production by at least 17 per cent, furnaces do not have to run for as long, which means casthouses bring their energy prices down. Part of this is the amount of time furnaces run and burn energy while personnel wait for analysis. I've seen this myself many times.
Advances in smelting technology, such as the non-consumable anode and new cell technology, aim to lower electricity consumption and increase renewable energy use. The secondary sector focuses on utilising 100 per cent recycled aluminium, with ACT assisting in the removal of fine oxide inclusions to create clean aluminium.

AL Circle: Aluminium cans recycling volume in the UK is growing, standing at 81 per cent as of 2024. How is this growing recycling trend supporting the adoption of advanced casthouse technologies in the domestic market?

John Courtenay: Aluminium cans form a truly circular recycling loop. Used cans are collected, melted and turned straight back into new cans. This is where our technologies play a crucial role. Our fluxes help clean the melt by significantly reducing inclusions, ensuring the metal going back into new cans is as clean and consistent as possible. As can-to-can recycling grows, so does the demand for high-performance fluxes that can handle the increasing volumes of light scrap entering the system.

Our Refinal HAL F7 flux is particularly effective in this area. It is designed for treating light scraps, such as can-body offcuts from automotive and sheet production, and excels at removing fine oxide inclusions that other fluxes struggle with. The cleaner the melt, the better the results for our customers – higher-quality metal, fewer defects and more efficient production overall.

AL Circle: Amidst concerns over scrap leakage, how were UK casthouses able to secure scrap for recycling in 2025? What is your outlook on scrap availability in 2026 and beyond?

John Courtenay: In 2026, with scrap availability under increasing pressure and casthouses relying on whatever recycled material they can secure, BatchPilot and our flux technologies together offer a vital, one-stop solution. BatchPilot is unique in the industry, eliminating waiting times and bringing accuracy to furnace weighing at a moment when operators cannot afford delays or guesswork. By tightening up the melting and batching processes, it helps customers cut costs, improve consistency, and significantly increase production at a time when recycled inputs are more variable than ever.
Alongside this, our Refinal HAL F7 flux has become especially important in today's recycling-driven market. As casthouses deal with more light and lower-quality scrap, like dirty can-body pieces and mixed recycled materials, HAL F7 helps to cleanly remelt even the worst materials by getting rid of tiny oxide particles that usually lead to casting problems. With scrap constraints shaping the industry in 2026, these two technologies together allow casthouses to melt whatever material they can get their hands on – while still maintaining high metal quality and throughput.

ACT
ALUMINIUM CASTHOUSE TECHNOLOGIES

TRANSFORMING CASTHOUSE TECHNOLOGIES, SHAPING THE INDUSTRY.

REFINAL™

FUSED REFINING FLUXES

- MINIMUM **35%** MAGNESIUM CHLORIDE AND ADDED FLOURIDE TO ENHANCE PERFORMANCE AND INCREASE EFFICIENCY BY UP TO **25%**
- REFINAL HAL F7 UNIQUELY REMOVES VERY FINE OXIDES BELOW 12 MICRONS PRODUCING ULTRA-CLEAN METAL

CASIFLUX™

BONE ASH FREE LAUNDER COATING

- ENVIRONMENTALLY-FRIENDLY, NO HAZARDOUS GASES

BATCHPILOT™

FURNACE HEEL & TRANSFER WEIGHT AUTOMATED SYSTEM

- ELIMINATION OF SHORT CASTS
- INCREASE **'RIGHT FIRST TIME'** BATCHING
- **17%** INCREASE IN PRODUCTION

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Rodabell Group Accurate Partner

Alejandro Rellán García,
CEO of Rodabell

Redefining aluminium casting with precision cooling and metal control

Alejandro Rellán García is an Electrical Engineer from the European University of Madrid (UEM) and holds an International MBA from IEDE. He began his professional career in California, where he spent two years working on land prospection projects for the development of wind energy installations, gaining early exposure to the renewable energy sector and large-scale infrastructure projects.
He later joined Rodabell, a company founded by his father in 1980 to provide technical services to Spanish aluminium smelters. Since then, Alejandro has been actively involved in supporting aluminium producers worldwide, with a focus on casthouse operations, molten metal handling, and plant maintenance. His work centers on improving operational efficiency, product quality, and process reliability, helping plants adapt to increasing technical demands and sustainability challenges across the industry.

AL Circle: Over the past decade, aluminium smelters have significantly modernised their operations. From your perspective, which technological priorities are most critical for casthouse and plant engineering today?

Alejandro Rellán García: In the past, most of the priorities were mainly focused on increasing metal output and also achieving the highest possible metal quality. In my opinion, those aspects are still important today, but the ones I believe are the main technological and critical priorities are:

Electricity consumption: new smelting technologies are less power-demanding and more efficient in terms of energy consumption.

Decarbonisation in thermal systems: increase furnace efficiencies, shifting from fossil fuels to electrically

powered systems when possible.

AI integration and digital control: The integration of AI and control systems can achieve a more stable process and help improve the 2 points stated above.

Usage of environmentally friendly materials: Reduce the usage of carbon-based materials and increase the usage of environmentally friendly materials. For example: inner anode technologies, usage of biodegradable lubricants….

Integrated Automation: Less labour-dependent jobs will help increase the process homogeneity and improve safety operations.

AL Circle: In many aluminium plants, the casthouse ultimately determines product quality and operational efficiency. Which bottlenecks or recurring challenges do you most frequently observe in billet and slab casting facilities?

Alejandro Rellán García: Yes indeed, the casthouse is the last metal processing facility in the smelter and the ultimate responsible party for determining efficiency and quality. Rodabell is mostly involved in engineering metal treatment, and casting for billets and slabs. In this process, I believe the main challenges include:

Poor Casting process stability: The ability to accurately monitor and control the whole casting process. Not being able to implement an automatic casting process to achieve an excellent operational process.

Continuous metal quality monitoring: Lack of usage of inline measuring technology to detect defects instantly in terms of molten metal quality, and also, on the finished cast product.

Equipment reliability and Maintenance: In many facilities, the results of some defects are a result of a lack of maintenance on the casting machine and tooling.

AL Circle: How is Rodabell approaching innovation in casting equipment, refractory systems, and plant maintenance services to support goals like extending equipment lifecycles while reducing downtime and maintenance costs?

Alejandro Rellán García: Rodabell is approaching innovation by relying on engineering and designing systems driven by data in their entire lifecycle. By looking into casting trends provided by Rodabell casting control system, we are able to identify problems and react in a preventive way. This situation avoids corrective maintenance that usually results in extended casting line stoppages.

AL Circle: Demand for aluminium is rising across electric mobility, renewable energy infrastructure, and lightweight transportation, all of which require higher-quality billets and slabs. In what ways are casting technologies evolving to meet more demanding metallurgical and quality standards?

Alejandro Rellán García: The demand for "special" alloys and high-purity aluminium is rising to cover the demand of the applications described in your question. In order to adjust to these new customers' needs, the main focus is on technology to control the solidification stage and also the metal treatment process. Some initiatives are:

Advanced molds designs for both billets and slabs.

Very precise water cooling and metal level control systems

High-efficiency degassing and filtering equipment

AL Circle: What operational or technological requirements stand out among smelters in emerging hubs where Rodabell has steadily expanded its presence beyond Europe, particularly in major aluminium-producing regions such as the Middle East?

Alejandro Rellán García: Smelters in Europe are smaller in size when compared to GCC plants. Middle East smelters are built on the premise of high volume and continuous operations. This means that the cast house needs to process huge amounts of metal 24/7. The casting machines are usually large, and process homogeneity and automation is key to reducing rejections and time disruptions. Keeping a high metal quality standard is also important in GCC since most of the production is intended for export.

AL Circle: While the industry's decarbonisation debate often centres on smelting emissions, casthouse operations and molten-metal handling also have an environmental footprint. Where do you see the most meaningful opportunities for improving energy efficiency and sustainability at this stage of the production chain?

Alejandro Rellán García: We talked briefly about some of the aspects Rodabell thinks will be the next opportunities to improve sustainable operations in the aluminium manufacturing value chain. For us, the focus should be on thermal efficiency, electrification linked to renewable energy generation systems, scrap processing systems integration, and value chain integration, when possible, to avoid long-distance transportation and unnecessary remelting.

AL Circle: Automation, sensors, and real-time data monitoring are gradually becoming integral to modern aluminium plants. How do you expect digitalisation to reshape casthouse operations, maintenance planning, and process control in the years ahead?

Alejandro Rellán García: In our field of casting machines engineering, automation and AI integration open a new work philosophy, moving from operator-driven to model-driven casting. We can feed the machines with all kinds of data to keep improving the process, and we can also get so many different alarms

to react fast against a malfunction.

AL Circle: Finally, looking ahead to the next decade, which technological breakthroughs or engineering solutions do you believe will most transform aluminium casting and plant maintenance practices globally?

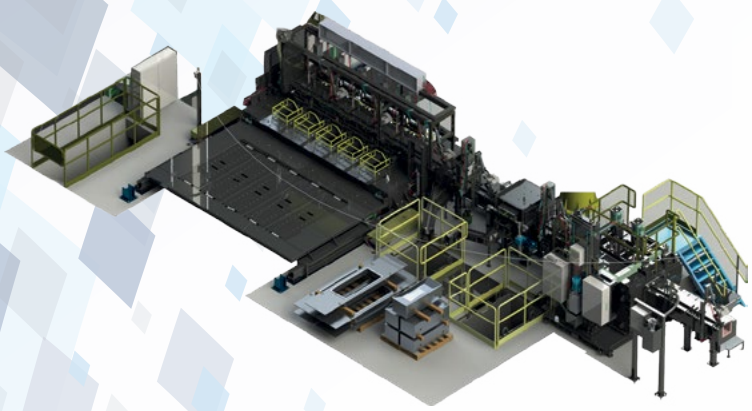
Alejandro Rellán García: I see several areas of transformation in the different stages of the smelting process, but I would like to mention 2 points that, in my opinion, stand out:

Inert anode technologies that will change the process we see today at the potlines and carbon plants.

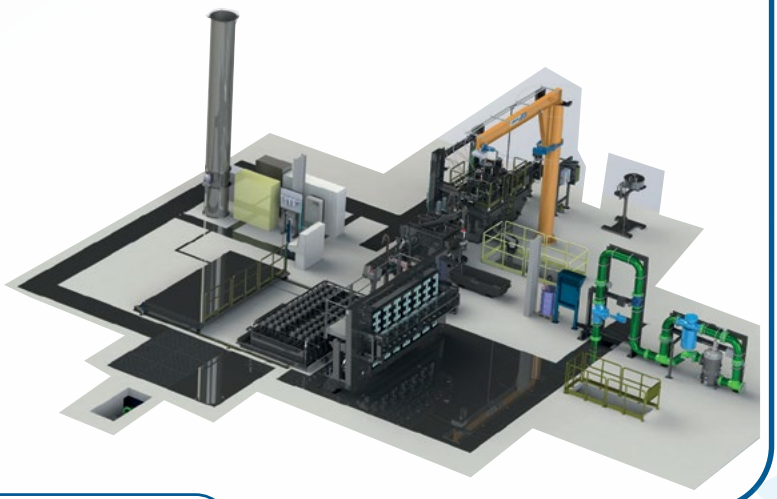
Sensors, artificial vision, and AI integration will allow remote casting operations in the same way modern medicine uses robot-assisted operations by doctors located in different areas of the planet.

Rodabell®
Group Accurate Partner

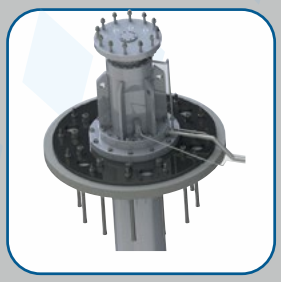
SLAB CASTING LINE



BILLET CASTING LINE



CASTING EQUIPMENT

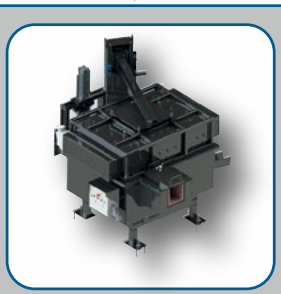


CASTING CYLINDER

- Single acting
- Internal anti-rotation rod guide system
- Integrated torque limiter
- Minimum rod deflection guaranteed
- Long life piston rod coating
- Specially designed hidraulic Power unit control
- Control loop for casting speed regulation

DEGASSING SYSTEM

- Vessel cartridges and insulation kits
- Heating systems
- Degassing rotor/shaft
- Lid lifting/turning system
- Platform access for drossing operations & rotor replacement

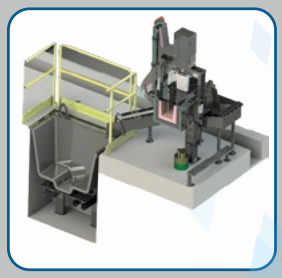


CERAMIC FOAM FILTER

- CFF lining castridge and insulation kit
- Air based preheating system
- Electrically powered lid
- Safe draining mechanism
- Ceramic Foam Filter available in all sizes and porosity levels
- Mechanical lock-out system for safe filter assembly & removal

ROD FEEDER

- Dual/Single rod design.
- Speed range: 5-6000 m/min
- PLC controled
- Conection to SCADA available
-Customized coil holder design

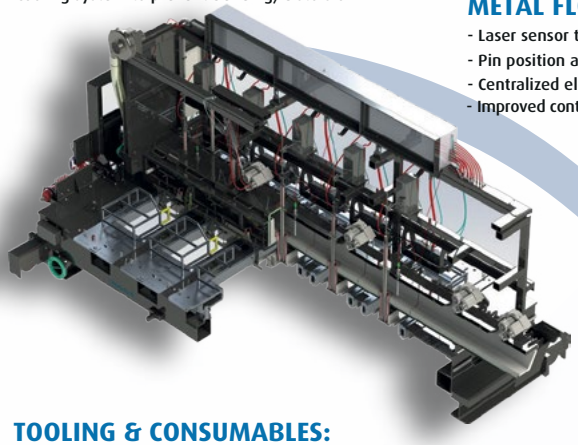


AUTOMATIC METAL LEVEL CONTROL

- Hands-free casting
- Sensors and actuators supplier
- Software Development
- Systems integration
- Project management
- Training

CASTING LAUNDER / CASTING TABLE:

- Automated casting launder (hands-free casting)
- Integrated preheating equipment
- Automatic lids
- Fused silica refractories (low density)
- Thermocouples integrated for Temp. monitoring
- Cooling system to prevent bending/distorsion



AUTOMATIC/MANUAL METAL FLOW REGULATION:

- Laser sensor technology for metal level control
- Pin position actuators
- Centralized electrical outlet
- Improved control software

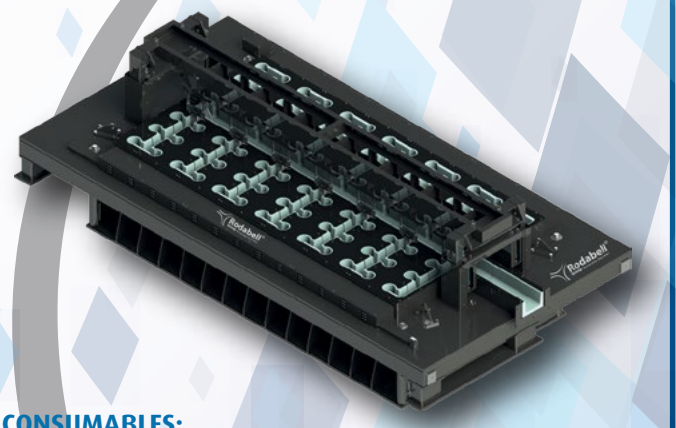
TOOLING & CONSUMABLES:

- Platform & Bottom block support
- Bottom blocks & Plugs machining
- Casting table (tilt-able or powered travel bogie system)
- Casting molds
- Tooling spare parts

AIR DRIFT MOLD TECHNOLOGY

RAPID-FILLING SYSTEM

- Improves cast start stage
- Precisely machined control dams



TOOLING & CONSUMABLES:

- Rodabell AirDrift Mold for high quality billet production
- Mold accurately machined from Aluminium blocks
- Mold designed for amplified cooling effect

AL BIZ

Top Suppliers of LeaderSpeak 2026

Gescons (1961) Private Limited

GESCONS (1961) PRIVATE LIMITED

Manufacturer of Aluminium Die Casting Components

Smelter Engineering Private Limited

Smelter Engineering

Manufacturer of Industrial Furnace

New Cast Die Casting Pvt Ltd

Newcast Die Casting Pvt Ltd

Manufacturer and Exporter of Aluminium High Pressure Die Casting Components

Tirth Sales

Manufacturer and Trader of Aluminium Pressure Die casting Components

Horizon Metal Components

HORIZON METAL COMPONENTS

Manufacturer of Aluminium Industrial Die Casting

MNC International

MNC INTERNATIONAL FORGED CAST & MORE

Manufacturer of Aluminum Zinc Pressure Die Casting, Pressure Die Casting and Sand Casting Components

Matthew Piper
Technical Business Development Director for MQP.

“Our Opticast sample preparation system is designed to give casthouses improved melt quality, reduced operational costs,”

Matthew Piper, Technical Business Development Director for MQP, is a leading specialist in the global aluminium industry and producer of Optifine grain refiners. With 15 years of experience, he oversees the global sales and technical development of high-efficiency grain refiners and casthouse solutions. Matthew’s expertise spans master alloys, grain refiners, specialty alloys, and powder metallurgy. He began his career at London and Scandinavian Metallurgical Company and later worked at Metalysis and P&B Metal Components. At MQP, he combines international sales leadership with hands-on metallurgical support and laboratory oversight.

AL Circle: MQP is a global leader in technologies used during the production of aluminium alloys. As these alloys gain wider use in high-performance sectors such as EVs, aerospace and packaging, how are performance requirements evolving and how is MQP supporting these advancements?

Matthew Piper: Before aluminium can be turned into finished products, mined bauxite must be reduced down to create primary aluminium, which then needs to be treated to remove unwanted oxides to enable it to solidify without cracking. This is achieved through the addition of a grain refiner. However, grain refiners on the market pre-2000 were notoriously inconsistent in performance, resulting in defects, poor quality material and waste.

Using our expertise and our Opticast grain refiner testing system, combined with scientific research by BCAST, we developed Optifine high-efficiency grain refiners, which result in casthouses needing to add 70 per cent less grain refiner to avoid cracking than if they used other standard TiBAl grain refiners. This was previously unheard of and resulted in improved quality and reduced operating costs by typically 50 per cent.

Since then, we have seen demand for 'ultraclean' aluminium skyrocket, particularly from the aerospace and luxury car markets for high-strength and 'mirror-like' surface quality applications. This is where 'cleanliness' of the grain refiner used is a prerequisite to meet the quality specifications of the finished product, calling for ultra-low levels of inclusions such as particle agglomerates, local defects and impurities.
A 5:02 grain refiner is seen as the holy grail for cleanliness. However, the use of 5:02 has been restricted only to the highest grades because it shows low and highly variable grain refinement efficiency. During studies of the performance of currently available commercial grades of 5:02, it was found that efficiencies, as measured by Opticast, varied from 20 per cent to 60 per cent of that of Optifine 3:1.
Using knowledge gained from our BCAST research, we are currently developing a high-efficiency 5:02 with guaranteed minimum performance levels that deliver a minimum of 70 per cent efficiency, making it possible to reduce addition rates and, therefore, application costs by a huge 50 per cent, all while guaranteeing consistent grain refinement performance. Crucially, our new 5:02 contains only 20 per cent of the boride present in 5:1 and 3:1 compositions, making it ideal for 'cleanliness'. We are currently trialling this amazing product, which has been developed to maintain the Ti content while reducing B contamination.

AL Circle: MQP's Opticast system is designed to replace traditional trial-and-error methods by enabling precise measurement of grain refiner performance under different melt conditions. In an industry where melt variability remains a challenge, what role can such testing methods play in establishing consistent efficiency benchmarks across global aluminium production?

Matthew Piper: Our pioneering Opticast sample preparation system is designed to give casthouses tighter process control, improved melt quality and reduced operational costs.
The unit, quite unique in the industry, brings a host of features aimed at streamlining grain refiner testing, a critical step in preventing casting defects such as cracks, porosity and inconsistent grain size in global aluminium production.
The system, which can be set up on a standard desktop, prepares and completes samples in just 3-5 minutes. It has pre-set timings for anodising, rinsing and polishing via an HDMI controller, audible alerts signalling the end of each stage, and externally mounted plastic bottles that safely store and dispense polishing and anodising liquids.
The system also produces a surface finish suitable for direct, accurate grain-size measurement using a polarising microscope, and can be positioned close to the casting pit for maximum convenience.
Opticast removes the guesswork that has long challenged casthouses and makes maintaining a consistent grain size across melts no longer trial and error, which often leads to scrapped charges, product downgrades and higher processing costs. Since its launch in 2000, Opticast has helped hundreds of casthouses avoid such issues, allowing them to rapidly "test-drive" their grain refiners and optimise addition rates. It is a reliable control method, as if you know the level, you can correct as necessary.

AL Circle: Grain refiners play a critical role in preventing defects such as cracks, porosity and surface imperfections during aluminium casting. With aluminium producers under pressure to improve productivity and reduce waste, how significant is grain refinement technology in improving the overall efficiency of casthouse operations?

Matthew Piper: Grain refiner technology has come on leaps and bounds in the past few decades, and we have proudly led the way in this. From the start, our vision was to comprehensively improve melt quality by being experts in the key technology around grain refining, helping casthouses produce the best aluminium to make the highest quality end products, make cost efficiencies and cut carbon emissions.
In practical casting processes, the use of our Optifine grain refiners can drastically reduce the formation of twins caused by dendritic growth, decrease process segregation, cold shut and hot cracking tendencies, improve solidification shrinkage during the process, eliminate or better disperse porosity, and enhance casting density and surface quality, improving the success rate of casting and facilitating subsequent ingot processing, thereby improving productivity and reducing waste.
Grain refiner is, arguably, a casthouse's second biggest spend and by using Optifine instead of standard grain refiner, customers can also save up to three dollars per tonne or hundreds of thousands of dollars a year in a medium-sized plant.
One customer benefiting is Henan Zhongfu Industrial Co, which, when adding 0.2 kg/t of Optifine rods to a 5182-alloy ingot, is seeing better grain refinement than that achieved by adding 0.8 kg/t or lower dosages of

standard rods. In the production of over 200,000t of high-quality products, grain sizes are meeting 100 per cent of specifications while saving over 1 million RMB when compared with using a standard grain refiner. Today, Optifine 3:1 100, 5:1 100 and 5:1 125, which has 85 per cent more active nuclei than a low efficiency grain refiner and are three times more efficient than standard grain refiners on the market, are used in the production of over five million tonnes of alloys a year at 45 casthouses worldwide. The launch of our new 5:02 grain refiner will cater for yet another market, which we are very excited about.

AL Circle: Aluminium alloys are valued for their strength-to-weight ratio and recyclability across multiple industries. In the coming years, where do you see aluminium strengthening its competitive position against materials such as steel, plastics and composites, and how is MQP preparing to support this shift?

Matthew Piper: Aluminium will continue to gain ground over steel, plastics and composites as industries push for lighter, more energyefficient and sustainable materials. Its strengthtoweight ratio and recyclability make it ideal for EVs, aerospace and renewable energy, where cutting emissions and improving performance are key.

We are supporting this shift by helping casthouses produce cleaner, more consistent alloys at lower cost. Our lowcarbon Optifine grain refiners and the new ultraclean 5:02 grade deliver high efficiency at much lower addition rates, allowing producers to meet tight specifications even with higher scrap inputs. As demand for lightweight, lowcarbon metals grows, we're ensuring customers can cast highquality aluminium reliably and sustainably.

AL Circle: As aluminium alloy production increasingly shifts toward recycled inputs to support decarbonisation, how is the use of scrap influencing alloy composition control, quality, and consistency, and how is MQP supporting producers in managing these changes?

Matthew Piper: Recognising the urgency of sustainable corporate action not only safeguards against supply chain disruptions and punitive legislation, but also unlocks a profitable business strategy driven by growing consumer expectations and demand.

Not only do we have a pipeline of products that are made with low-carbon aluminium, meaning they're manufactured using hydro-electric power or wind power to bring down CO_2 emissions, but we can also take our customers' production scrap aluminium and melt it down to create our grain refiners and master alloys, which they ultimately buy back. Making our grain refiners on a 'closed loop' recycling basis is very attractive as customers endeavour to improve their practices in a meaningful way that goes towards meeting emissions targets.

We also strongly continue to promote the message that if the world was to adopt Optifine, fluoride by products and emissions would be cut by two-thirds. The higher relative efficiency means less energy used, fewer coil changes and transportation around the casthouse and lower warehouse inventory.

AL Circle: As scrap supply becomes more competitive and strategically important across regions, how does MQP view the scrap landscape and its impact on the industry?

Matthew Piper: In the past, the composition of a furnace full of metal might contain 80 per cent scrap and 20 per cent prime metal. But because aluminium casthouses are now unable to get hold of prime metal, many simply have to use 100 per cent scrap.

Using scrap metal is a fantastic way to keep on reusing aluminium, there's no doubt about it. Aluminium is one of the most recyclable metals on the planet, and reusing it keeps the world on track to Net Zero and the industry in line with Carbon Border Adjustment Mechanism (CBAM) regulations. Increasingly so with demand for the use of 'lightweight', sustainable metals in the production of everything from EVs to aerospace.

The big problem is that scrap metal generally contains residual titanium from previous casts, unlike 'virgin' metal. When you then add in your aluminium grain refiner, you can find yourself with titanium above the end user's specification. The alloys, therefore, do not meet the specification and are rejected by the customer. Being 'out of spec' can be devastating for a casthouse business.

We realised that if customers could significantly reduce the amount of grain refiner they needed to add to the melt without compromising quality, we might be able to resolve the issue. Because our grain refiners bring down addition rates by up to 90 per cent when compared with standard grain refiners, we have resolved the issue of too much titanium.

AL Circle: MQP supports aluminium producers globally with technologies used at the casting

stage, where consistency and efficiency are critical. As tariffs and trade barriers increasingly reshape aluminium supply chains, how do you see these policies impacting cost structures, process standardisation and overall competitiveness across the global aluminium industry?

Matthew Piper: Escalating US tariffs on imported alloy products are severely disrupting trade flows and preventing American manufacturers from accessing next-generation casting technologies, advanced materials and innovations they had relied on before. As a result, high-end aerospace producers and other top-tier users in the US are being pushed back to standard grain refiners, which deliver lower, more variable performance, introducing greater inconsistency into critical casting processes and risking undermining quality standards in some of the most demanding applications.

Like many exporters, we have had to shift our focus away from the US, where our products have become commercially unviable. However, this has meant we've looked at new markets, which resulted in the company's production growing by 40 per cent in 2025.

AL Circle: In the current geopolitical environment, with several aluminium production facilities curtailing or halting operations, how is MQP, as a technology provider, being impacted in terms of demand, operations, and customer engagement, and how does it view the evolving market dynamics and supply chain uncertainties in the aluminium industry?

Matthew Piper: At this year's TMS conference, industry discussions highlighted China's decision to cap aluminium production at 50 million tonnes. Despite the cap, demand continues to rise, and new smelters are coming online to fill capacity needs. China has grown from a relatively small producer to supplying around half of the world's aluminium, a remarkable shift considering that just two years ago the country was operating under a strict zero-growth policy.

With this, and with President Trump's tariffs, we have been working hard to win contracts in Europe and further afield. In 2025, we secured contracts with independent producers in Turkey, Czechia and Brazil, and with 'Big 5' producers. These new contracts are potentially worth around 50 tonnes a month in sales.

The situation in Iran is having an impact on freight costs and longer delivery times, but our network of international warehouses largely mitigates these delays and ensures customers can access stock when needed.

We are also well-positioned to respond to these developments thanks to our strong base of consultants and agents.

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Hya Ola Furu
Sales and marketing

Structural shifts in scrap availability are forcing casthouses to operate with far greater variability in metal quality, chemistry, and cleanliness

Ola Furu is responsible for the Sales and marketing at Hycast and part of the Management Team.
He started his professional career in Hydro in 2003 and has worked in various positions both within Hydro and Hycast.
He holds a Master's degree in finance from University of Western Sydney.

AL Circle: Hycast is highly recognised for aligning R&D with market needs. So, when casthouses today are under pressure from cost volatility, scrap shortages, and decarbonisation mandates, what technological priorities are you considering in your R&D this year? Additionally, where do you see a gap between industry expectations and the realistic deliverables of technologies?

Hya Ola Furu: Hycast was founded as a spin-off from Hydro R&D 35 years ago, and that heritage still shapes our approach today. We have a clear strategy to continuously develop better ways to refine metal and cast the required alloys with the highest possible safety, quality and efficiency. We see an expectation of low inclusion and hydrogen levels in cast products from recycled aluminium. To combine this with the expectations of low cost, low amounts of drain metal, and little temperature loss in the launder is a technological challenge that we are currently working on, but this is not a quick fix.

AL Circle: The aluminium industry across the world is facing structural disruptions in scrap availability alongside geopolitical supply risks. How is Hycast adapting its technology to operate efficiently under inconsistent scrap inputs? What compromises in productivity or quality should operators expect in this

situation?

Hya Ola Furu: Hycast reply: Structural shifts in scrap availability are forcing casthouses to operate with far greater variability in metal quality, chemistry, and cleanliness. Increased use of post-consumer scrap brings wider fluctuations in impurities, oxides, and hydrogen levels compared with primary aluminium. Hycast's response has been to focus on robust, tolerant technology designs combined with strong process control, rather than solutions optimised only for ideal input conditions.

Our technology is developed to minimise sensitivity to upstream fluctuations, allowing stable casting even when scrap quality varies from day to day. This includes melt treatment and refining solutions capable of handling broader chemistry windows, combined with equipment designed for consistent operation and long lifetime with limited operator intervention. Advanced monitoring and control help stabilise temperature, flow, and melt quality, reducing operational stress and unplanned disruptions.

AL Circle: With extrusion plant closures planned by Norsk Hydro in Europe and Indian extrusion sector under stress due to fuel constraints, how do you assess long-term demand for extrusion casting technology beyond 2026?

Hya Ola Furu: While the extrusion industry is currently under pressure in several regions, Hycast does not interpret announced plant closures or energy-related constraints as a structural decline in long-term demand for extrusion billets. Instead, we see this as a period of regional adjustment and consolidation, rather than a permanent reduction in underlying billet demand.

In Europe, rationalisation of extrusion capacity reflects cost pressure, energy prices, and regulatory factors, but downstream demand for aluminium extrusions remains supported by long-term trends such as lightweighting, electrification, infrastructure renewal, and sustainable building solutions. Over time, this demand will continue to require a stable, high-quality billet supply, although it may be served by fewer, more efficient casthouses.

In India, near-term stress linked to fuel availability and pricing is influencing extrusion capacity utilisation, but the fundamental growth drivers—urbanisation, transport, renewable energy, and industrial expansion—remain intact. As market conditions stabilise, billet demand is expected to follow these growth patterns.

From a technology perspective, this environment reinforces the need for flexible, efficient, and recycling-ready casting solutions, suitable both for new investments and for upgrading existing facilities. Beyond 2026, Hycast therefore expects continued demand for extrusion casting technology, increasingly characterised by selective investments, capacity modernisation, and a stronger focus on cost efficiency, robustness, and sustainability rather than pure greenfield expansion.

AL Circle: Energy efficiency is no more a choice but a survival requirement. Please tell us how much energy does Hycast technology reduces (in % terms) at the casthouse level? What is the payback period for customers investing in these upgrades?

Hya Ola Furu: One example is the Hycast SIR drain-free degasser compared with standard box-type degassers. With conventional systems, the degasser typically must be emptied into a bin at each alloy change; this metal must either be remelted later or kept hot between casts. This is typically around 1 tonne of metal. Similarly, the Hycast DFF (drain-free filter) eliminates the need to drain metal into a drain bin and typically saves around 300 kg of drain metal per cast.

AL Circle: Automation is undoubtedly a solution for fast and efficient operation, but it comes with high capital costs and integration challenges. Where do you see automation genuinely improving ROI for casthouses, and where is the industry overestimating its impact?

Hya Ola Furu: Hycast has offered a hands-free start- and end-of-cast automation system for 30 years. The primary drivers have been operator safety and consistent quality. More recently, we have focused on solutions for automated metal sampling, monitoring beneath the casting table, and removing the need for operators to manually inspect for water and apply oil to starter blocks before casting. These initiatives reduce manual tasks and, together with an integrated MES system, helps improve safety, reduce manning requirements, and strengthen operational excellence. I also believe that better and more affordable sensors will help Casthouses do better preventative maintenance.

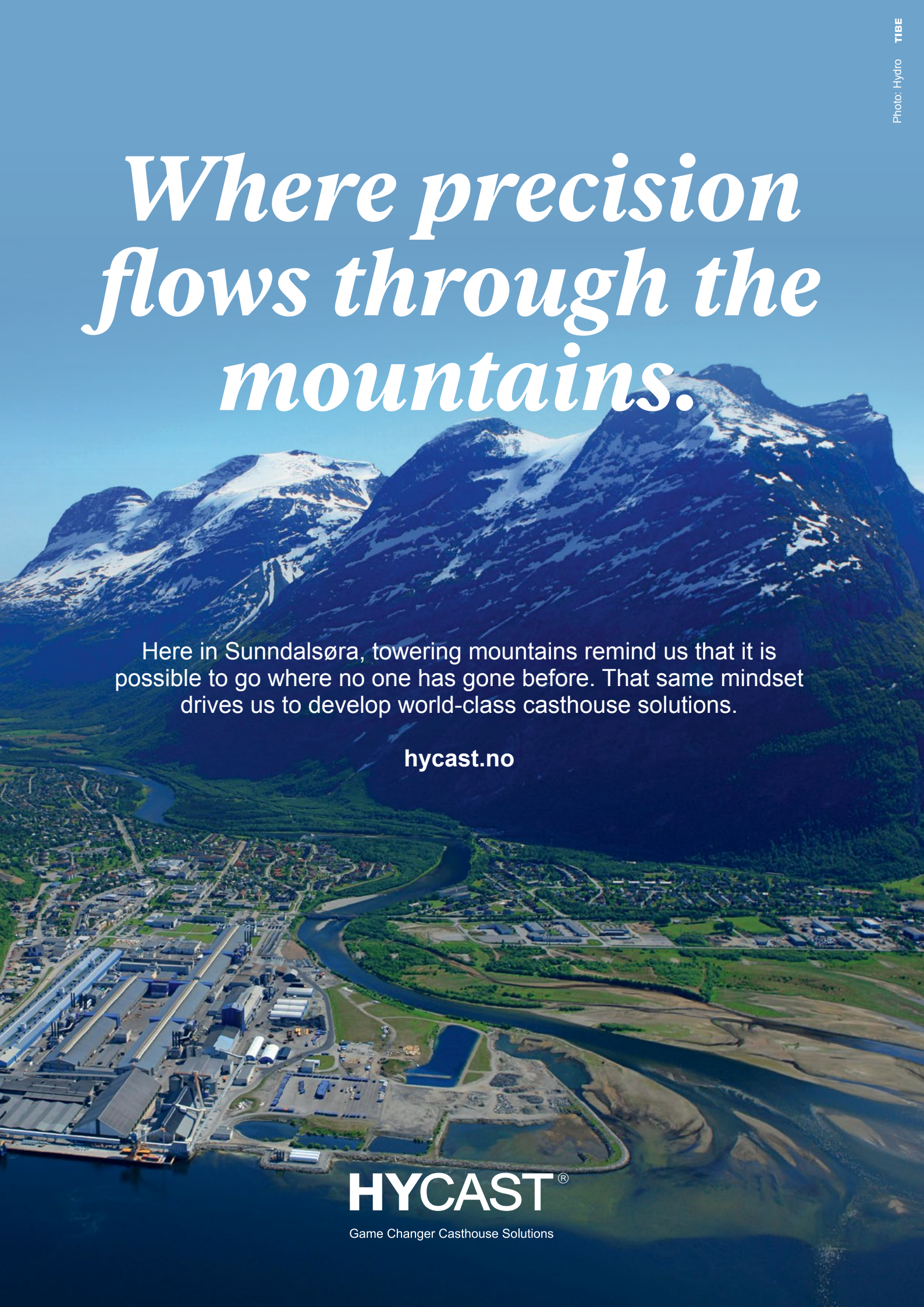
AL Circle: Geographically, aluminium demand growth is shifting towards Asia, while Europe faces structural decline. Is Hycast reallocating its strategic focus away from Europe to Asia? What concrete steps are you taking to capture growth in emerging markets?

Hya Ola Furu: Hycast always looks for projects that

match our technology and where we can deliver high-quality systems to our customers. We will continue to pursue opportunities in emerging markets and consider expanding our footprint where it makes sense from a long-term perspective.

AL Circle: Across the aluminium value chain - primary, downstream, and recycling - each segment is now facing distinct pressures. Which segment is actually driving investment decisions in casthouse technology today, and which one is being overhyped in terms of future demand?

Hya Ola Furu: I would say that scrap availability—combined with aluminium being a highly recyclable material aligned with the growing focus on sustainability—is a key driver of investment. This is likely to continue over the next decade. In parallel, we also see a willingness to invest in additional primary capacity to become more self-sufficient and less dependent on external supply.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Thangadurai Sankaralingam,
Director of Thermal & Export Sales at Calderys India

"India is no longer just a growth market — it is becoming a global benchmark for refractory innovation"

Thangadurai Sankaralingam, Director at Thermal & Export Sales at Calderys India, brings over three decades of hands-on experience across the industrial materials spectrum, including abrasives, insulation, and advanced refractories.

In 2005, he joined Calderys India, where he steadily advanced through leadership roles over nearly two decades. His progression includes positions in regional sales leadership, followed by heading the aluminium, non-ferrous, and DRI vertical as general manager before being appointed director of Thermal & Export Sales in September 2025. In his current role, he is responsible for refractory sales across key sectors such as cement, aluminium, DRI, power, and petrochemicals, while also driving the company's export growth across the APAC region.

His career spans extensive on-ground engagement across India, serving a diverse customer base ranging from integrated steel producers and OEMs to independent power companies. He began his professional journey with Murugappa Morgan Thermal Ceramics, where he spent his early years building core industry expertise.

AL Circle: The aluminium industry in India and across the APAC region is at an inflection point. From your vantage point, what are the most significant shifts you are seeing — and what does this mean for refractory producers like Calderys?

Thangadurai Sankaralingam: The aluminium industry in India is on a very strong growth trajectory. Capacity expansions are underway at multiple primary smelters, the secondary and recycling segment is accelerating rapidly, and foundry activity is picking up in line with the broader push for domestic manufacturing across

automotive and infrastructure. Each of these segments brings its own set of operating conditions, and consequently, its own refractory demands.
What this means for a refractory producer is that the bar is being raised continuously. Our customers are no longer evaluating refractories purely on the basis of initial cost. They are asking much harder questions — about campaign life, about how quickly we can deliver, about whether we can customise a solution for their specific process conditions, and increasingly, about environmental performance. This shift from transactional procurement to solution-based partnering is something Caldery has been preparing for, and the establishment of CAPES—our new integrated plant in Odisha— is our most concrete answer to these evolving expectations.

AL Circle: CAPES has been described as one of the world's largest single-site greenfield refractory plants. What is the vision behind it, and how does it specifically benefit aluminium producers?

Thangadurai Sankaralingam: The Calderys plant in Odisha, also known as CAPES, represents a fundamental shift in how we think about refractory supply in India. Located in Odisha, the plant is in close proximity to the country's largest primary smelting operations and key export ports. That geography is not coincidental — it is strategic.
At its full build-out, CAPES will span 45 acres and house six dedicated production lines. These lines meet all the needs for aluminium refractory products, including acidic and basic monolithic products, acidic and basic bricks, tap-hole clays, and casting fluxes.
For an aluminium producer, this arrangement means a single, reliable source of supply for everything from the potroom and carbon section to the cast house and holding furnaces.
CAPES serves as a dual-purpose engine: it provides just-in-time support for domestic plants—where every hour of downtime is a loss—while acting as a high-tech export hub for the broader Asia-Pacific market. With CAPES, delivery timelines that previously stretched across several weeks – particularly for specialised or imported products – can now be reduced to just a few days.
From a quality standpoint, with advanced R&D and automated manufacturing, the facility delivers precision-engineered solutions tailored for complex processes like smelting and refining. Aluminium producers can plan their maintenance windows with greater confidence when they know the materials they are installing will perform exactly as specified. Furthermore, CAPES' focus on sustainability through energy-efficient operations helps partners meet modern green standards. Ultimately, CAPES isn't just a factory; it's a strategic pivot that makes the entire APAC supply chain faster, more reliable, and more self-sufficient.

AL Circle: CAPES introduces several products that were not previously part of Calderys India's core offering. What are the most significant additions for the aluminium segment?

Thangadurai Sankaralingam: One of the most important new capabilities is the local production of anode baking furnace bricks — ABF bricks. This is a product category that is critical for primary aluminium smelters. These bricks must withstand extreme thermal cycling, significant chemical aggression from the carbon baking process, and substantial mechanical loads— all simultaneously. Producing them locally at CAPES with HWI & Calderys' global expertise, technical know-how, and the quality controls we now have in place opens a completely new value proposition for Indian smelters.
Beyond ABF bricks, we have strengthened our

aluminium portfolio in several key areas. Our non-wetting castable range, sold under the ALKON® and ACCMON brands, is specially made to prevent aluminium metal and dross from sticking in furnaces, making cleaning much easier and helping the lining last longer. For cast houses, our Precast Pre-Fired (PCPF) blocks and launders are purpose-built to accelerate installation, eliminate the need for lengthy dry-out procedures, and maintain metal purity during the casting process.

We are also offering advanced slag-resistant products for secondary aluminium operations, where the chemical environment tends to be far more aggressive due to the variety of scrap inputs. Each of these additions reflects a deliberate decision to build a portfolio that covers the complete aluminium value chain— not just the highest-volume product categories.

Key aluminium-focused products from CAPES:

Anode Baking Furnace (ABF) bricks — now produced locally for the first time in India.

ALKON® and ACCMON non-wetting castables — for superior metal and dross resistance in furnaces

PCPF blocks and launders — enabling faster installation and improved casting quality

Slag-resistant monolithics for secondary and recycled aluminium operations.

AL Circle: Energy efficiency and decarbonisation are increasingly non-negotiable priorities for aluminium producers. How is Caldery's refractory solution contributing to those goals?

Thangadurai Sankaralingam: Refractory design has a direct and measurable impact on a furnace's energy performance. The reality is that the lining is the primary barrier between the furnace process and the surrounding environment— and the quality of that barrier determines how much energy escapes as heat

loss.
Our high-performance, low thermal conductivity castables and engineered multi-layer lining systems are designed specifically to minimise that heat loss. The energy savings from a well-designed lining can be substantial over the course of a campaign, and they translate directly into lower fuel consumption and reduced CO_2 emissions.
Campaign life also plays a critical role. Every reline is a shutdown, and every shutdown consumes resources and generates waste. Products like our non-wetting castables and ABF bricks are engineered for extended service life, which means fewer relining cycles, less material consumption overall, and less disruption to operations.
From a manufacturing perspective, the automated processes at CAPES also contribute to sustainability. Consistent, well-controlled production reduces reject rates and material waste. And the proximity of CAPES to our key aluminium customers means that logistical distances and associated emissions are significantly lower than with imported alternatives.

AL Circle: The recycled aluminium segment is growing rapidly, yet it also presents some of the harshest operating conditions for refractories. What is Calderys doing to address those demands?

Thangadurai Sankaralingam: The manufacture of recycled aluminium products presents challenging issues in terms of temperature, chemicals, and mechanical stress.
To address these challenges, we have developed targeted solutions within our product range. The ALKON® FD—Fast Dry—series allows for much faster and safer heating of freshly installed linings by efficiently eliminating free water. This is particularly valuable in secondary operations where downtime is especially costly.
For situations with corrosive alloys and strong flux chemicals, the ALKON® SOL CAST HT provides better protection against damage while keeping the lining strong for longer periods. We are also developing hybrid relining approaches that combine PCPF blocks in specific zones with spray casting and advanced monolithic materials—allowing customers to optimise both installation speed and in-service performance.
Zonal refractory design is increasingly central to how we approach secondary furnace linings. Rather than specifying a single material throughout, we map the chemical and thermal load profile of each zone and select the most appropriate material accordingly. This targeted approach extends the overall campaign's life and reduces the likelihood of localised failures that lead to premature shutdowns.

AL Circle: As we look ahead, how do you see the relationship between Calderys and aluminium producers evolving— and what should the industry expect from Calderys India over the next few years?

Thangadurai Sankaralingam: The relationship is clearly moving well beyond the traditional supplier model, and I think this evolution is irreversible. Aluminium producers have grown more sophisticated in how they evaluate their refractory partners — they want a partner who understands their process, who can respond quickly when conditions change, and who is developing tomorrow's solutions today. That is the relationship Calderys is building.
With the breadth of a portfolio that CAPES enables—covering everything from the electrolysis cell and carbon section to the furnace and cast house— we are now genuinely able to support our customers across the entire smelting and casting process. That comprehensive capability, combined with local manufacturing, responsive technical support, and ongoing R&D investment, is what a true refractory partner looks like.
In terms of what to expect from Calderys in India, specifically, CAPES will continue to ramp up its production lines and expand the product range available locally. We will be deepening our technical service capabilities, with a focus on lining design, installation support, and campaign performance monitoring. And we will be extending our export reach across the APAC region, bringing the quality and innovation of CAPES to aluminium producers well beyond India's borders.
India is no longer just a growth market for refractories — it is becoming a global benchmark. CAPES is proof of that ambition, and the aluminium industry will continue to be at the center of everything we do.

CALDERYS PLANT IN ODISHA, INDIA - CAPES

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Please contact
Thangadurai Sankaralingam
thangadurai.sankaralingam@calderys.com

Chinmoy Sur
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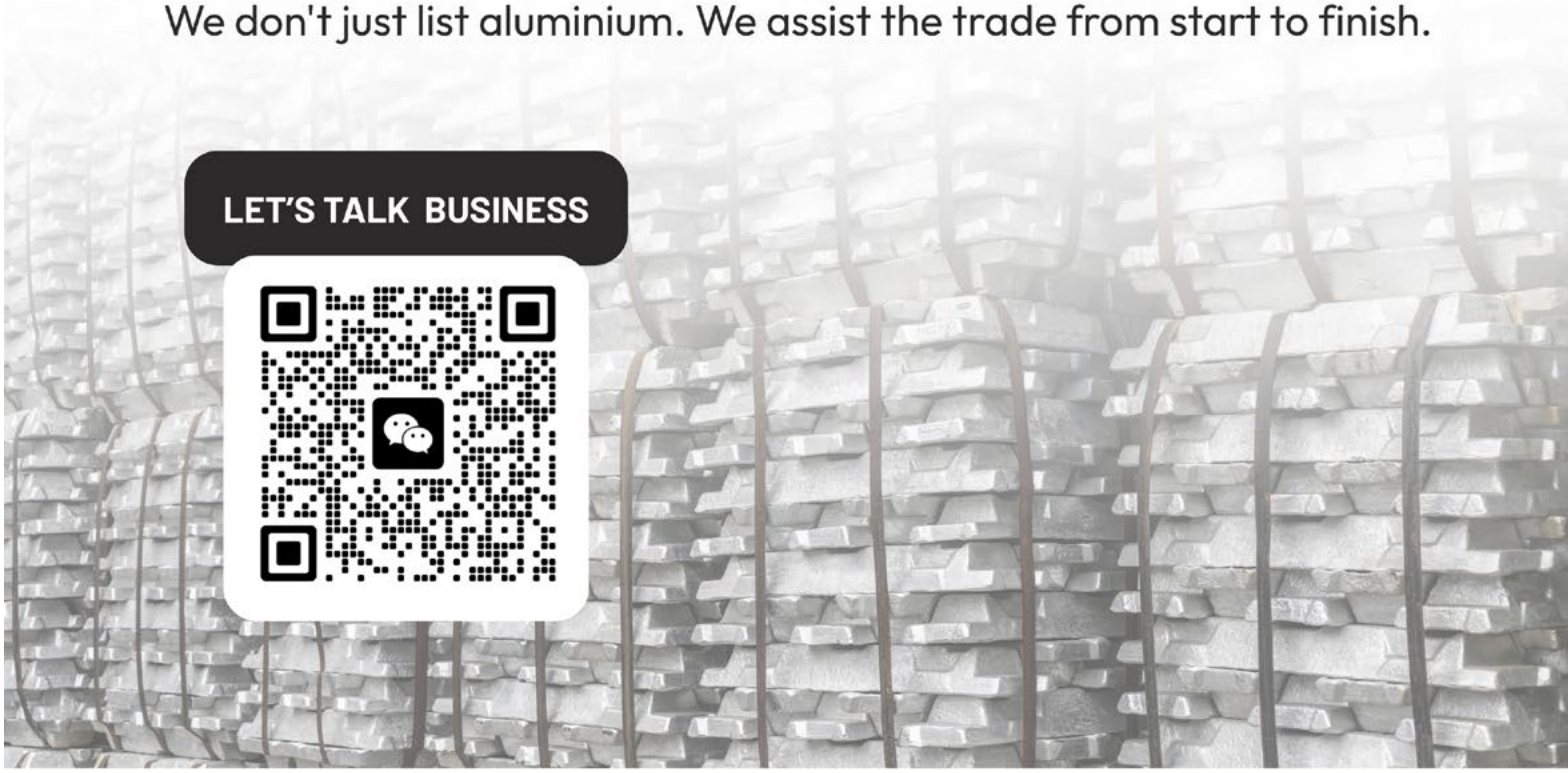

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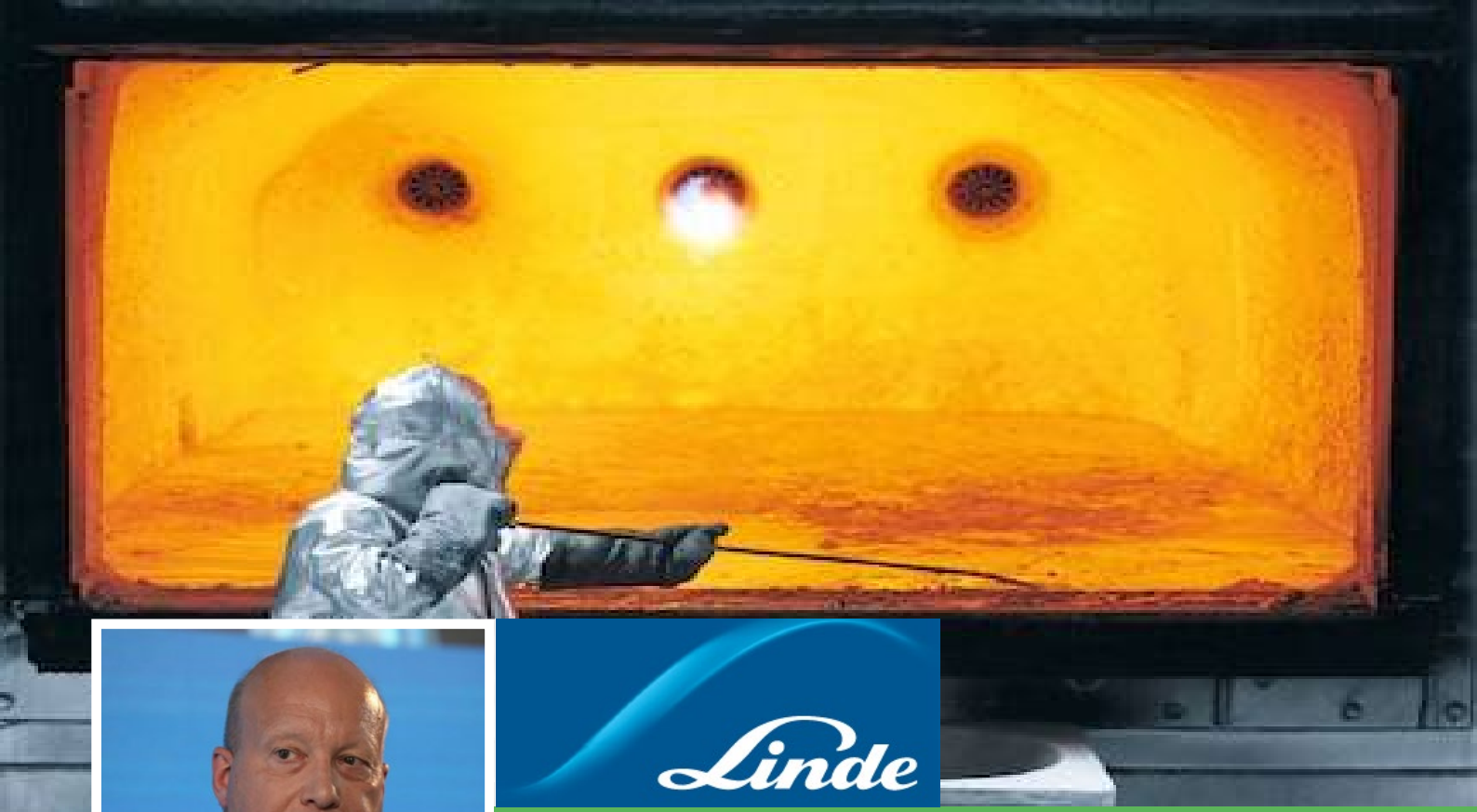


Joachim von Schéele
Global Director Commercialization, Linde plc

Decarbonisation in aluminium won't start in theory—it starts in the furnace

Joachim von Schéele, Global Director Commercialisation at Linde plc, is a respected authority on the intersection of geopolitics, policy, and energy-intensive industries. His work focuses on how these forces shape business strategies, investments, market dynamics, and long-term outcomes across sectors. His international experience includes a decade in Asia, where he served as Vice President for South Asia in India and later led Application Development and Sales for Asia-Pacific in China.

AL Circle: As aluminium producers accelerate their decarbonisation efforts, how does Linde view the evolving role of casthouse operations within the industry's broader emissions-reduction strategy over the next decade?

Joachim von Schéele: As Scope 1 emissions come directly from fuel used in casthouse operation, increased energy efficiency results immediately in reduced emissions. Moreover, recycling and secondary aluminium are rising, making casthouse efficiency even more important. The use of oxyfuel solutions in the melting reduces fuel use and carbon intensity while increasing melt rate, and oxyfuel systems create a platform for future efficient use of hydrogen as a fuel. Hence, with oxyfuel as a vehicle, casthouses become the fastest and most practical starting point for decarbonisation.

AL Circle: Linde works closely with aluminium producers and dross-processing partners worldwide. From Linde's perspective, what are the key challenges customers face in managing aluminium dross, and how can oxygen-based technologies improve metal recovery and reduce value losses? Based on Linde's project experience, what recovery levels

are achievable today, and what performance improvements are being targeted going forward?

Joachim von Schéele: This is a very important topic, as even small dross-related losses have a major financial impact for producers. Contrary to the use of conventional oxyfuel, Linde's semi-flameless Low Temperature OxyFuel (LTOF) technology – today in use in more than 50 furnaces worldwide – avoids hot spots, supporting reduced dross formation during melting. Additionally, use of inert-gas atmospheres (Ar, N_2, CO_2) helps minimise oxidation during dross cooling and processing. When combining stable oxyfuel operation with proper scrap quality, a high metal yield is achievable. Results from our customers show that we can achieve up to 99.75 per cent recovery of primary alloys.

AL Circle: The shift from air-fuel to oxyfuel combustion removes nitrogen from the process and enables a more efficient furnace atmosphere. How does Linde expect LTOF and hydrogen-ready combustion systems to influence the future design and optimisation of aluminium melting furnaces?

Joachim von Schéele: As nitrogen is removed, oxyfuel creates a CO_2 + H_2O-rich atmosphere with substantially stronger radiative heat transfer. Typically, this results in melt rates increasing by ~40 per cent without structural furnace changes, and it also reduces the flue-gas volumes by 80–85 per cent, simplifying off-gas systems. Linde tools like OPTIVIEW (image analysis of flue-gas composition) and OXYSENSOR can further improve combustion stability and furnace operation control. Oxyfuel is an important step on the pathway to efficient use of hydrogen. Implementation of such hydrogen-

ready systems prepares furnaces for future low-carbon fuels, which could also include syngas from feedstocks such as Municipal Solid Waste, biomass, and waste plastics.

AL Circle: As casthouses look for ways to reduce energy consumption and emissions, how can oxyfuel, oxygen-enrichment, and lancing technologies help improve furnace efficiency and support smarter energy management?

Joachim von Schéele: Oxyfuel can substantially improve melt rates and reduce specific energy use and emissions. Oxygen lancing is an efficient way to stabilise multi-chamber furnaces and support the energy-efficient melting of oily or VOC-rich scrap. Oxygen-enrichment has its limitations but could offer a stepwise efficiency improvement without full conversion. Advanced control tools such as OPTIVIEW and OXYSENSOR support consistent and efficient furnace operation.

AL Circle: With growing demand for low-carbon aluminium, how is Linde approaching hydrogen integration for remelting operations, and what impact could hydrogen have on the technological and economic landscape of aluminium recycling in the coming years?

Joachim von Schéele: Linde has been a leading supplier of hydrogen for more than 50 years, currently having sales across the hydrogen value chain at USD 3 billion. We see the use of hydrogen as a natural continuation of the oxyfuel pathway: to use the same technology to first reduce fossil fuel consumption and then use less hydrogen – oxyfuel's fuel-saving effect makes future hydrogen use more economically viable. LTOF systems are already hydrogen-ready and maintain stable melting behaviours. It has been proven that Linde's hydrogen-oxyfuel delivers strong heat transfer with low NOx. Moreover, Linde is expanding green hydrogen production globally to support future adoption.

AL Circle: Several aluminium plants have recently reduced output or paused operations. Does Linde expect these market conditions to slow the adoption of advanced combustion and process technologies? Looking ahead, which regions or market segments offer the strongest opportunities for Linde to support efficiency and decarbonisation in aluminium remelting?

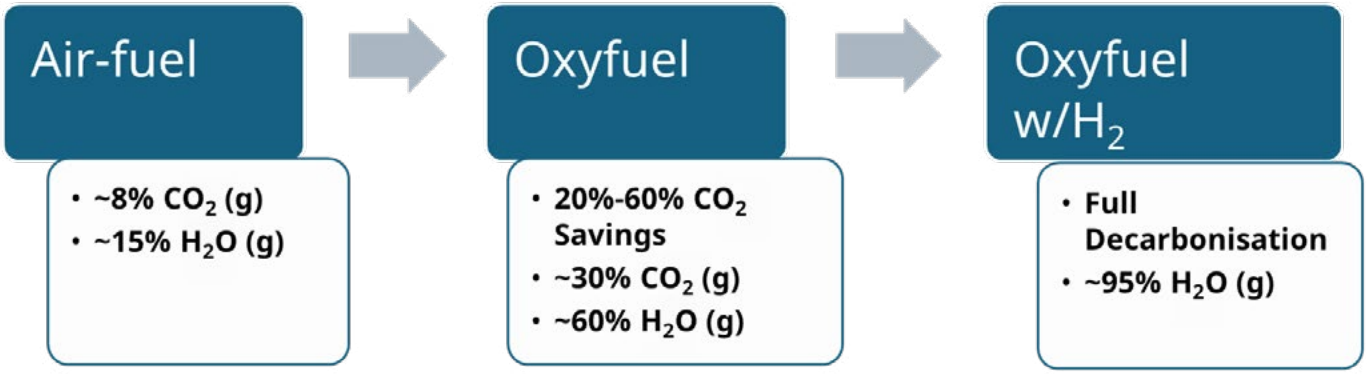
Joachim von Schéele: Efficiency and stability become even more valuable in tight market conditions. During slowdowns, it is important for producers to seek a lower cost per tonne, and oxyfuel helps increase throughput – facilitating the use of a smaller number of furnaces or reduced operating hours – and reduce fuel use. We see the strongest growth in regions expanding secondary aluminium capacity. Also, Linde's LTOF AIROX hybrid burners are of interest in this context, offering flexibility: oxyfuel for melting, air-fuel for holding.

AL Circle: The EU's Carbon Border Adjustment Mechanism (CBAM) is reshaping global aluminium trade and increasing the importance of verified low-carbon production. How does Linde view this shift toward carbon-based tariffs, and how is the company positioning its technologies to help producers remain competitive under emerging carbon-cost frameworks?

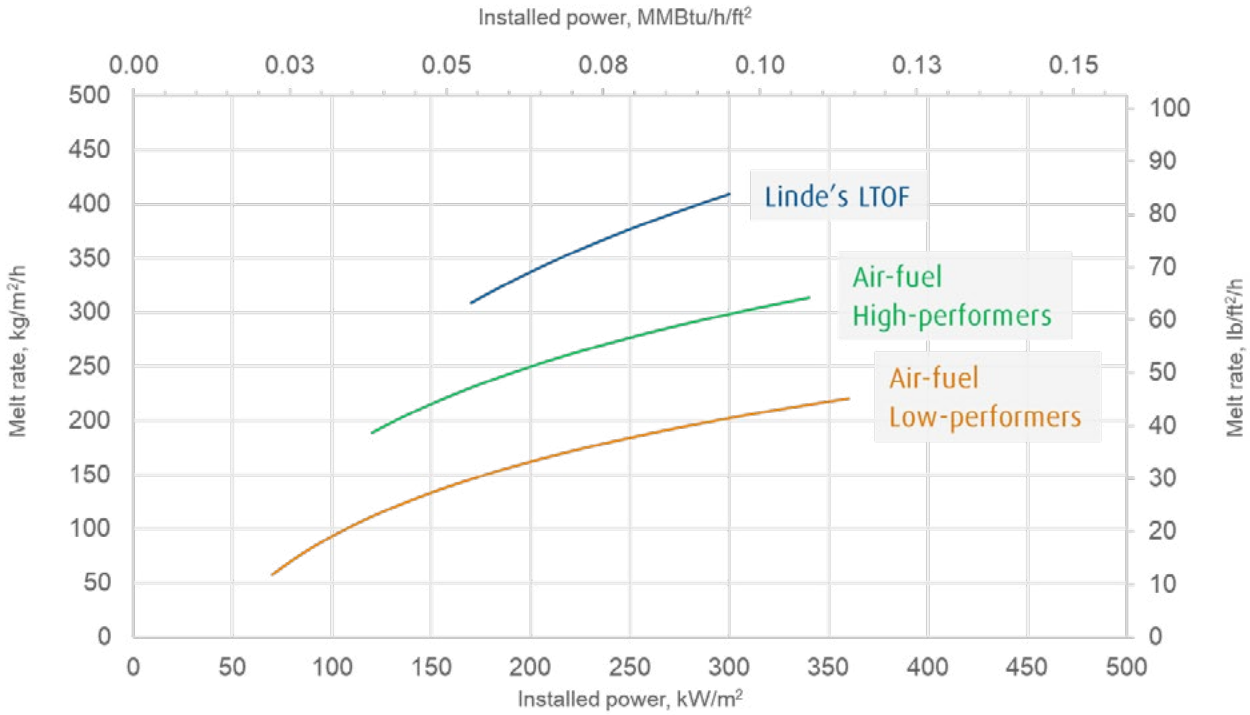
Joachim von Schéele: CBAM benchmarks secondary aluminium at 90 kg CO_2/t, requiring efficient operations. Oxyfuel supports producers to reach fuel-efficiency below 500 kWh/t performance levels. Linde's portfolio, including gases – oxygen, hydrogen, inert gases – and advanced combustion, supports verified low-carbon production. Our technologies help producers to stay competitive under such carbon-based tariff frameworks.

AL Circle: With China nearing its primary aluminium production ceiling and a few smelters announcing shutdowns, the global supply–demand balance is tightening even as new greenfield projects emerge elsewhere. How does Linde interpret these dynamics, and what role can Linde play in helping the industry meet rising demand while managing energy, efficiency, and decarbonisation pressures across different regions?

Joachim von Schéele: China is near to its 45 Mt/year primary production ceiling, and some smelters are even shutting down. Supply is tightening while demand continues to grow. The current situation in the GCC countries has further accentuated the tightening supply. Oxyfuel increases melt rates by ~40 per cent and



reduces energy use by 30–50 per cent, hence boosting output from existing assets. Moreover, oxyfuel enables the processing of more contaminated scrap, supporting secondary aluminium growth. Hydrogen-ready LTOF positions Linde to support global decarbonisation and supply-demand challenges.



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Maestria

Benoit Verreault
Executive Vice-President of Maestria Solutions

“In the intense environment of modern aluminum smelters, where pots operate at extreme temperatures and electrochemical reactions run nonstop, safety is no longer just a regulatory checkbox, it has become a strategic imperative”

Benoit Verreault, Executive Vice-President of Maestria Solutions and Special Advisor at QualiTech, has over 25 years of experience in manufacturing IT and industrial automation. Since the merger of Maestria and QualiTech in late 2023. QualiTech is focused on the integration of their world-class SMART acquisition and MES technologies for many years.

Mr. Verreault has developed a robust international network from scratch, serving the aluminum and manufacturing sectors across North America, Europe, the Middle East, and Asia-Pacific. Formerly the CEO of the Centre de Géomatique du Québec, Groupe Uni-Spec and other technology firms, he has managed mandates for industry leaders including Rio Tinto and Hydro-Québec. He is widely recognized for implementing world-leading mobile measurement systems for electrolysis cell current distribution, which remain a global benchmark in smelter operations.

Smelters navigate molten metal at approximately 960°C, high-voltage systems, moving cranes, and the ever-present risk of process instabilities. Traditional safety approaches, such as manual patrols, general sirens, and static public-address announcements have long served as the backbone of plant protection. Yet these reactive tools increasingly fall short in an era of tighter margins, multilingual workforces, and growing pressure to decarbonize while maintaining output.

A prime example is the anode effect in the Hall-Héroult process. When alumina concentration drops too low, a high-resistance gas film forms on the anode, triggering voltage spikes, cell instability, excessive energy

consumption, and emissions of perfluorocarbons (PFCs). These events not only waste power and harm the environment but also create immediate hazards for nearby workers. Without rapid, precise intervention, a single anode effect can cascade into broader disruptions. Industry reports highlight that frequent anode effects undermine current efficiency, accelerate anode wear, and elevate risks in already hazardous molten-metal environments where explosions from moisture contamination remain a persistent threat.

Classic systems struggle in this context. Broad alerts reach everyone equally, which causes alert fatigue. Language barriers slow comprehension. Delays in notification allow small instabilities to become costly incidents. Most importantly, these approaches rarely anticipate problems because they only respond once alarms have already sounded. The shift to proactive intelligence is already underway. Industry 4.0 technologies are transforming safety from a series of isolated reactions into a coordinated, predictive ecosystem.

The Central Nervous System: Intelligent Message Diffusion Notification

The foundation of this new safety architecture is a centralised, intelligent notification system. The future vision is clear: fully autonomous safety orchestration that manages events early, before they harm people or production.

Imagine a system connected to the pot control system that automatically detects an emerging anomaly and broadcasts it to the appropriate staff, instantly crafting a precise, multilingual message. That message is synthesised in the operator's preferred language, targeted only to the affected pot line or zone, and delivered simultaneously across multiple channels (voice, SMS and email).

This requires a platform that operates independently of human shift changes. Automated alerts generated directly from real-time data streams ensure that critical information is broadcast the moment a threshold is breached. This minimizes the risk of human oversight in managing critical information. Systems designed with this philosophy work side-by-side with pot control systems, enabling instant delivery of critical operational and security messages via voice, email, SMS, and other connected systems. By keeping plant staff informed through targeted messages, these platforms boost safety and efficiency.

Proven implementations in major global facilities demonstrate the viability of this approach. Our integrations between vocal announcement systems and established pot control platforms have been successfully deployed across North America, the Middle East, and coming soon in India. These implementations highlight a crucial success factor: true Interoperability. By working closely with control systems, these notification platforms have shown they can significantly reduce operator reaction time. In scenarios such as monitoring anode effects, the ability to instantly deliver operational and security messages via voice and connected systems keeps plant staff informed and enhances production safety.

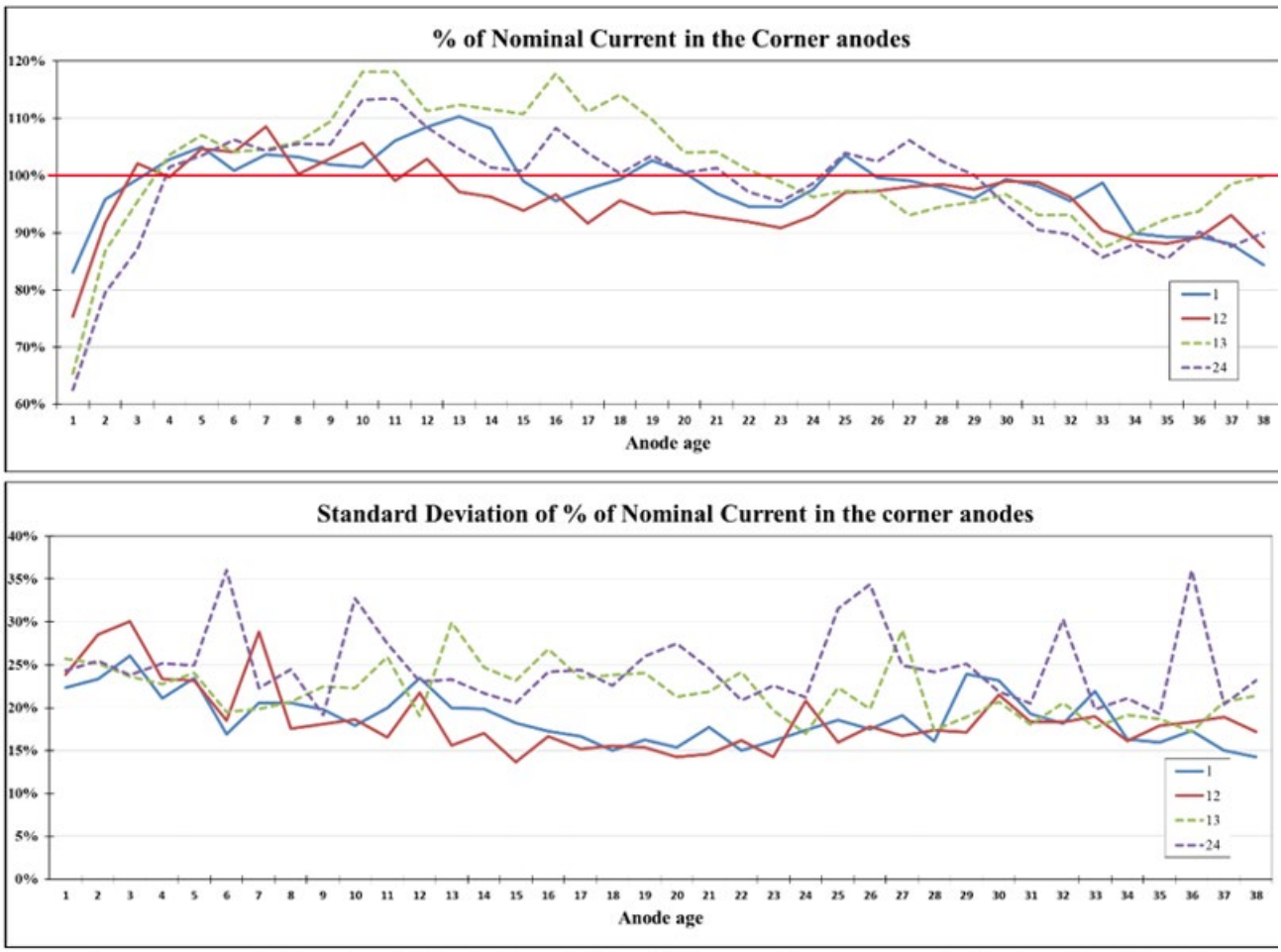
Crucially, this central system must be multilingual. Global industrial facilities often host a diverse workforce, and safety instructions must be understood by everyone, regardless of their native language. Synthesized voice technology allows for dynamic, multilingual messaging that delivers clear instructions in the listener's preferred language. This capability is no longer a luxury; it is a necessity for inclusive safety. Reliability also depends on redundancy. Critical messages should be disseminated simultaneously via public address systems, digital displays, and connected mobile devices. This ensures that even if one channel fails, the warning still reaches personnel. The system must be always on, running 24/365, autonomous and relentless.

The Coming Revolution: Enhancing Awareness with Portable Intelligence

While a central notification system provides plant-wide awareness, it cannot always detect hazards specific to a worker's immediate breathing zone or micro-environment. Fixed sensors mounted on ceilings or walls may miss localized leaks, dust clouds, or heat pockets that occur at ground level. To bridge this gap, the next evolution in safety involves deploying a new class of portable environmental security devices.

We envision a new category of devices that function as rugged, deployable environmental monitoring systems tailored for industrial environments. They shift safety from reactive to proactive, enabling real-time personal and area monitoring. In settings like smelters, invisible threats such as poor ventilation, chemical vapors, dust, heat stress, or equipment-related environmental failures pose serious risks to workers.

Additionally, in high-risk environments, portable fall detection systems using IMUs (Inertial Measurement



Average and Standard Deviation (SD) of the nominal current during the life of the corner anodes. Anode age is in 12-h shifts.

Units) provide essential real-time monitoring. When coupled with a central notification system, these units ensure a rapid emergency response even for isolated workers.

Rather than relying on specific consumer-grade models, the industry is moving toward industrial-grade telemetry units that prioritize durability and integration. These devices measure overlapping key parameters such as CO2, VOCs (Volatile Organic Compounds), particulate matter, temperature, and humidity. In an industrial context, acting like a personal gas detector combined with an environmental guard in the breathing zone is essential. Real-time detection triggers immediate alerts, allowing workers to evacuate or adjust PPE before exposure reaches harmful levels.

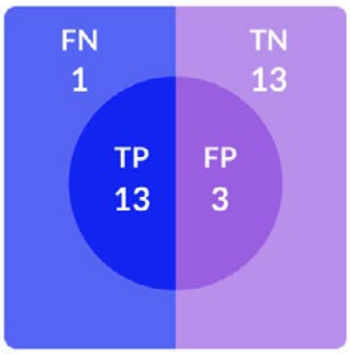
The true value lies in connectivity. These devices must not operate in isolation. They require communication capabilities via Wi-Fi, Bluetooth, cellular networks, or newly available Mesh Networks that connect dynamically. This allows the device to push data to a central dashboard or, more importantly, send alert requests directly to the central notification system (vocal or other means). When a portable node detects a dangerous rise in VOCs, a sudden temperature spike, or a fall, it should not alert only the individual. Through secure APIs, the device sends a signal to the central notification system. The central system verifies the alert and sends a targeted message through voice or other means to the specific area for action to be taken.

This creates a closed-loop safety ecosystem. The central system manages macro-level communication, while the portable nodes provide micro-level data. This combination greatly reduces the margin for human error when managing critical information. It ensures that alerts are not only heard but are based on tangible, localized data. For instance, if a portable node detects a pressure anomaly in a confined space, it can trigger the central system to lock out certain machinery and announce a stop-work order in multiple languages simultaneously.

The results – Smelter B/ Spike – 2 Days anticipation

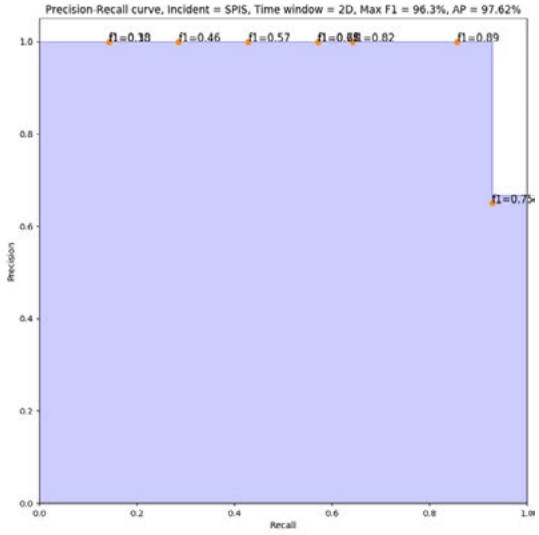
Incident type	SPIS (Spike)
Days window	2 days

Total number of incident actually occurred on the floor	14
Number of incidents predicted correctly 2 days before (TP)	13
Number of false positive prediction (FP)	3



Precision = (True Positives / Total Positives)
= 13 / 16 = **81 %**

Recall = (True Positives / Total Real Incidents)
= 13 / 14 = **93 %**



Maestria Solutions

The Road Ahead: Anticipation and AI

Looking further ahead, the next horizon is true anticipation. AI models trained on historical and live pot data will predict anode effects or severe instabilities minutes or even hours in advance.

It is worth mentioning that we recently conducted proof of concept using key operational data from a smelter that uses some of our technology. This proof of concept demonstrated that AI can effectively predict anodic incidents using daily anodic and cell measurements, collected in part using **Maestria Solutions** equipment by operator or **Maestria Potline startup team** combined with other operational data.

Notably, initial results showed a 90 % recall rate for two-day spike predictions, proof that extended foresight is achievable, though further validation is required for full-scale deployment.

These findings underscore that fully autonomous safety orchestration, which manages events early to prevent harm to personnel or production is the definitive way forward and warrants deeper investigation.

Given recent geopolitical instability, such as events in the Middle East, intelligent notification systems must evolve to monitor external regional threats alongside internal processes. By integrating security feeds and emergency networks, these platforms can automatically elevate security postures upon detecting instability, broadcasting shelter-in-place instructions, triggering lockdowns, and notifying personnel simultaneously. In an uncertain global landscape, facilities capable of rapidly acting on external threat information will better protect their people and assets, ensuring resilience against emerging risks.

In an era when smelters face global supply chain disruptions, rising costs, raw material availability challenges, geopolitical pressures, and energy volatility, plants equipped with predictive, orchestrated safety systems will maintain higher uptime, reduce environmental footprints, and enable superior worker safety. By anticipating process deviations and external threats before they escalate, these intelligent platforms transform uncertainty into operational resilience protecting both people and production.

Conclusion

As aluminum producers confront rising energy costs, stricter environmental standards, and the need for ever-higher reliability, the winners will be those that move decisively toward proactive intelligence. Technology exists today: automated, flexible,

multilingual, and relentlessly reliable.

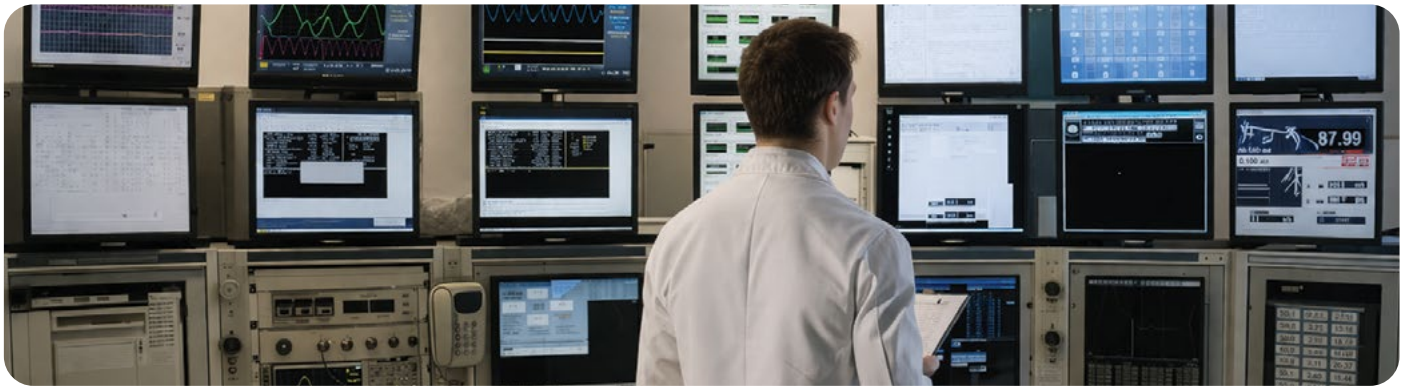
By embracing these intelligent notification ecosystems and soon integrating them with personal environmental monitoring, the industry can protect its workforce more effectively than ever before.

The smelters that act now will not only meet today's safety challenges. They will define the standard for the next decade of responsible, high-performance aluminum production.

The era of reactive alerts is ending. The age of anticipatory, orchestrated, and deeply personalized safety has already begun.

Maestria x QualiTech

MAESTRIA designs tools and products tailored specifically to the needs of the aluminium industry. Our software solutions help you save time and manage your business more efficiently.



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Maestria Solutions has been operating for over twenty years, primarily in the aluminum and agri-food sectors, delivering both turnkey solutions and fully integrated custom developments.

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Aitor Uranga Larrañaga
Technical-industrial professional

Primary aluminium producers embrace scrap: a strategic shift reshaping the industry

Aitor Uranga Larrañaga is a technical-industrial professional with over 30 years of experience in the sale and delivery of projects within industrial environments. He combines solid technical expertise with a strong commercial focus, acting as an effective link between engineering and business functions to deliver efficient, results-orientated solutions.

The aluminium industry is undergoing a very deep transformation. The traditional divide between primary and secondary production is steadily fading as leading primary producers increasingly integrate scrap into their operations.

Several smelters worldwide are already moving in this direction, signalling a broader shift across the sector. The message is clear: scrap is no longer just a secondary raw material — it is becoming a strategic asset for primary smelters

A new set of pressures driving change

The growing adoption of scrap is not happening in isolation. It is the result of converging forces that are reshaping the economics and priorities of the aluminium industry.

Decarbonisation has become a defining driver. With increasing regulatory pressure and customer demand for low-carbon materials, aluminium producers are accelerating efforts to reduce emissions. Recycling aluminium requires only a fraction of the energy needed for primary production, making scrap integration one of the most effective pathways to lower carbon intensity.

At the same time, energy volatility continues to reshape competitiveness across industry. For primary smelters, energy is not just a cost factor — it is a strategic

constraint. Incorporating scrap into the process offers a direct way to reduce energy consumption and improve operational resilience.

Meanwhile, the emergence of low-carbon aluminium premiums is reinforcing this shift. In sectors such as automotive, construction, and packaging, carbon footprint is increasingly influencing purchasing decisions. As a result, scrap integration is becoming not only an environmental lever but also a commercial advantage.

Scrap as a strategic resource

As demand for aluminium scrap continues to rise, driven by electrification, renewable energy deployment, and circular economy policies, access to high-quality scrap is becoming increasingly competitive.

Primary producers are responding by securing long-term supply agreements, investing in recycling capabilities, and progressively integrating scrap handling and processing into their core production strategies.

What was once considered a secondary or supplementary material is now emerging as a strategic resource in its own right.

The challenge behind the opportunity

Despite its clear advantages, scrap integration introduces a new layer of complexity into primary aluminium production.

Variability in scrap quality, impurity control (such as Fe, Cu, and Zn), organic coatings, and contamination all pose significant technical challenges. These factors directly affect metal yield, furnace stability, and overall process efficiency.

In practice, the main constraint is not the availability of scrap itself, but the ability to consistently process it to a level suitable for high-performance primary production.

Where technology becomes critical

At this stage of the industry's evolution, advanced scrap preparation and thermal treatment technologies are becoming essential enablers of change.

Insertec plays a key role in this transition by developing solutions designed to maximise the value of aluminium scrap before it enters the furnace. Through advanced thermal pre-treatment processes, contamination is reduced, coatings are removed, and metal recovery is improved.

The result is a more stable melting process, higher yield, reduced dross formation, and improved energy efficiency — all of which are critical for smelters operating under increasing pressure to decarbonise and remain competitive.

A structural shift, not a temporary trend

The integration of scrap into primary aluminium production is no longer an emerging concept — it is becoming a structural feature of the industry.

As sustainability targets tighten, energy markets remain volatile, and customers demand lower-carbon materials, the role of scrap will continue to expand. Primary producers are adapting to this reality, reshaping their processes and strategies accordingly.

In this evolving landscape, the challenge is clear: to integrate scrap efficiently, reliably, and at scale. At Insertec, as an experienced technology provider, our role is to enable that transition.

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Enabling efficient scrap integration

A structural shift, not a temporary trend

The aluminium industry is undergoing a very deep transformation.

The traditional divide between primary and secondary production is steadily fading as leading primary producers increasingly integrate scrap into their operations.

At Insertec we help you turning scrap into strategic value.

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Trader of Aluminium UBC and Wire Scrap

Pratyusha Chatterjee
Assistant News Editor, AL Circle

Is aluminium entering a tighter phase as 900 TWh energy demand meets Middle East disruptions and $3,500/t prices?

The global primary aluminium industry is presently transitioning through a period of unprecedented structural transformation, characterised by a fundamental modification from a market focused on incremental technological efficiency to one dictated by the stark realities of geography and geopolitics. Historically, the competitiveness of an aluminium smelter was measured by marginal gains in cell amperage or the optimisation of the electrolytic process. However, in the current landscape of 2026, the singular determinant of a facility's long-term viability has become its physical location and its subsequent access to low-carbon baseload energy and secure raw material corridors. As the industry enters a definitive phase of carbon-linked trade barriers and navigates the physical disruption of core production hubs in the Middle East, the traditional global supply chain is fracturing into a bifurcated market.

Carbon footprints as competitive benchmarks

Primary aluminium production remains one of the most energy-intensive industrial commodities, requiring an average of 13 to 15 megawatt-hours (MWh) per tonne of metal produced. On an industry-wide basis, this translates to an annual consumption of over 900 terawatt-hours (TWh), a figure that roughly matches the total electricity generation of a major industrialised nation like Germany.

Because electricity is the primary input, the carbon footprint of the metal is almost entirely a function of the regional grid or captive power source used during the smelting process.

The disparity in carbon intensity between regions is staggering. Smelters located in hydro- or nuclear-rich zones (such as Norway, Quebec, and Iceland) emit only a few tonnes of CO_2 per tonne of aluminium. In contrast, facilities in coal-dominated regions like China,

India, and Australia often emit between 12 and 16 tonnes of CO2 per tonne. This creates a carbon arbitrage where green metal produced in low-carbon jurisdictions fetches a significant premium in markets where carbon costs are internalised, such as the European Union.

The latest data from the International Aluminium Institute (IAI) indicates that while global emissions intensity has declined by approximately 4.4 per cent since 2019, the industry remains far from the 1.5-degree Celsius threshold, which would require reducing emissions to less than 0.5 tonnes of CO2 per tonne of metal by 2050.

The 2026 Middle East production crisis

The stability of the global aluminium supply was shattered in early 2026 by a major escalation in regional hostilities in the Persian Gulf. On March 28, 2026, the Al Taweelah smelter, operated by Emirates Global Aluminium (EGA) in the Khalifa Economic Zone, Abu Dhabi, sustained critical damage during a series of Iranian missile and drone attacks. This facility, which produced approximately 1.6 million tonnes of aluminium in 2025, was forced into a complete emergency shutdown.

Unlike a typical operational delay, the damage to Al Taweelah's power station and smelting circuits introduces long-term recovery timelines. EGA has stated that a full restoration of primary aluminium production could take up to 12 months.

Simultaneously, Aluminium Bahrain (Alba) was also targeted by Iranian strikes on the same day, resulting in damage that has left its 1.6 million tonnes per annum plant operating at an estimated lower utilisation. Previously, the manufacturer had already announced a 15 per cent production cut owing to the supply shortage from the Strait of Hormuz closure.

Disruptions in Gulf production hubs

The blockade of the Strait of Hormuz has created a secondary crisis in the form of raw material and energy shortages. Qatalum, the joint venture between Norsk Hydro and Qatar Aluminum Manufacturing Company, was forced to curtail operations to 60 per cent of its nameplate capacity starting in March 2026. This reduction was driven by a notification from QatarEnergy that natural gas supplies would be suspended or reduced due to regional infrastructure damage.

Alongside, the lack of access to Capesize and Baby Cape vessels for importing bauxite from Guinea and Australia has left regional refineries struggling to maintain feedstock.

The immediate market response to these physical shocks was a surge in London Metal Exchange (LME) futures to four-year highs, with prices surpassing USD 3,500 per tonne.

EU CBAM and the end of free allocations

While physical conflict disrupts the Gulf, a different kind of restructuring is occurring in the European Union. On January 1, 2026, the Carbon Border Adjustment Mechanism (CBAM) entered its definitive phase. This policy effectively imposes a carbon price on imports of aluminium, steel, and other emissions-intensive goods, aligning the cost of imported metal with the carbon prices paid by EU domestic producers under the Emissions Trading System (ETS).

The mechanism operates through the surrender of CBAM certificates, the price of which is tied to the weekly average auction price of EU ETS allowances. For 2026, the obligation covers 2.5 per cent of the embedded emissions in imported goods, but this will scale rapidly as the EU phases out free allowances for domestic producers over a nine-year period ending in 2034.

CBAM Implementation Schedule and Cost Trajectory

Phase	Duration	Requirement	Financial Obligation
Transitional	Oct 2023 – Dec 2025	Reporting Only	0%
Definitive Start	Jan 1, 2026	Mandatory Certificates	2.5%
Phase-in 2030	Jan 2030	Escalating Coverage	48.5%
Full Implementation	Jan 2034	100% Coverage	100%

The impact of CBAM for global exporters is a direct function of their carbon intensity. Producers in the Gulf or North America face manageable costs in the early stages, whereas coal-intensive producers in China and India face severe margin compression.

For example, if the EU carbon price reaches EUR 100 per tonne, the eventual cost of exporting high-carbon primary aluminium to the EU could exceed USD 1,000 per tonne, fundamentally altering trade flows.

Furthermore, the European Commission has hinted towards its intent to extend CBAM to downstream, aluminium-intensive products by 2028 to prevent carbon leakage, where finished goods are imported to circumvent the primary metal tax. This regulatory expansion forces every participant in the aluminium value chain (from miners to automotive OEMs) to implement robust Measurement, Reporting, and Verification (MRV) systems.

US trade policy and domestic shortages

In the US, trade policy has shifted toward a hyper-protectionist stance, aiming to revitalize a domestic primary smelting industry that has been in decline for decades. During 2025, the administration significantly increased tariffs on aluminium and steel imports under Section 232 of the Trade Expansion Act of 1962.

An initial 25 per cent tariff on all unwrought aluminium imports was implemented in March 2025, and this was subsequently doubled to 50 per cent in June 2025. These measures were intended to support domestic producers and counter low-priced, excess aluminium in the US market.

On April 2, 2026, President Trump issued a further proclamation that modified these tariffs, applying them to the full customs value of derivative products and clarifying that only metal smelted and cast within the US or a qualifying partner country like the UK could avoid the 50 per cent rate.

US aluminium tariff structure and price impact

The result of these policies has been a dramatic escalation in the 'all-in' price for American consumers. The US Midwest premium reached record levels of over USD 2,400 per tonne above the LME cash price, leading to total physical prices exceeding USD 5,000 per tonne. This is more than double the price paid in some Asian hubs, placing a massive cost burden on the US automotive and aerospace sectors.

Despite the high tariffs, domestic production has struggled to respond. The US produced only 660,000 tonnes of primary aluminium in 2025, meeting less than 15 per cent of its total demand.

Restarts have been slow. Century Aluminum's Mt. Holly facility in South Carolina is only expected to return to full production by mid-2026, while larger idled plants like Hawesville (Kentucky) and New Madrid (Missouri) remain closed due to unsustainable energy costs and the lack of long-term power agreements.

Is aluminium scrap a strategic asset?

As primary smelting becomes increasingly cost-incurring due to energy prices and carbon taxes, the industry has turned its attention to aluminium scrap.

Recycling aluminium requires only 5 per cent of the energy needed for primary production and produces roughly 95 per cent fewer emissions. This has led to the emergence of recycled aluminium as a distinct and increasingly valuable commodity class.

As the Aluminium Association has stated, in the US, roughly 85 per cent of total aluminium output is now produced using recycled scrap as the primary feedstock. However, a significant portion of US-generated scrap continues to flow overseas. In 2024, the US exported approximately 2 million tonnes of aluminium scrap, primarily to Asian processing hubs in India, Thailand, and Malaysia.

This 'West to East' flow has sparked a debate over resource nationalism. The Aluminum Association of America has called for immediate export bans on certain grades of scrap, particularly Used Beverage Cans (UBCs), characterising them as a 'strategic asset' for domestic supply security. Similarly, the European Commission is considering export restrictions to curb scrap leakage, with a final decision expected in spring 2026.

Regional deep dives

Simultaneously, there are case studies of countries from across the globe that detail how specific regions are adapting to the intersection of energy transition and geopolitical risk.

- **China reaches the red line**

China's role as the world's aluminium powerhouse is undergoing a curbing transformation. For years, the country dominated global supply, accounting for over 60 per cent of output.

However, the central government has enforced a 45-million-tonne annual capacity cap since 2017 to curb oversupply and pollution. In 2025, China produced just over 45 million tonnes, marginally exceeding the cap, and marked that the era of massive capacity expansion is over.

China is now focusing on optimising its geographic footprint by moving smelters from coal-fired provinces to provinces with hydropower potential, such as Sichuan and Yunnan.

Furthermore, as an exporter, China faces severe headwinds from CBAM and anti-dumping duties in Europe and the US. In response, China has increased importing volumes of primary metal (19 per cent in late 2025) while aggressively building secondary (recycled) aluminium capacity, aiming for 15 million tonnes of recycled output annually by 2027.

- **India's Odisha act as a megahub**

India is the world's second-largest primary aluminium producer and is currently in the midst of a massive expansion phase. The state of Odisha has emerged as the fulcrum of this growth, possessing 1.5 billion tonnes of metallurgical-grade bauxite and hosting over half of the country's smelting capacity.

Major players like Vedanta Aluminium and Nalco have committed billions of dollars to Odisha-based projects. Vedanta's greenfield project in Rayagada district includes a 3 MTPA aluminium smelter and a 6 MTPA alumina refinery.

However, the Indian industry faces a critical challenge: its grid remains 70-80 per cent coal-powered. To stay competitive in the CBAM era, Indian producers must invest up to USD 5 billion in 20 GW of renewable energy capacity by 2030, a project that is currently in its early stages.

- **Canada and the Nordics: The green safe havens?**

For consumers seeking low-carbon metal, Canada and the Nordic countries (Norway and Iceland) are the primary sources of supply. Canadian smelters, predominantly hydro-powered, produce metal with a footprint as low as 2 tonnes of CO2 per tonne of aluminium produced. However, the US tariff has forced a major reconfiguration of Canadian trade. In the first ten months of 2025, US imports from Canada fell by 14 per cent, leading Canadian producers to redirect shipments to Europe, where they are highly sought after to meet CBAM requirements.

Norway and Iceland remain the lowest-carbon

producers in the world, with footprints under 1 tonne of CO2 per tonne of aluminium produced. Despite their environmental advantage, these regions face capacity constraints and technical risks. For example, the Grundartangi smelter in Iceland cut production by two-thirds in late 2025 following an electrical failure, a disruption that tightened European supply for six months.

- **Compliance and penalty in the UAE**

Local regulations, combined with international pressures like CBAM, are forcing companies like EGA and Alba to aggressively invest in renewable energy (such as Masdar's solar projects) and decarbonization technologies to maintain their standing as premium global suppliers.

The outlook for the decade is defined by structural scarcity

The loss of Middle Eastern capacity in early 2026 cannot be offset by current idled capacity, much of which is structurally uncompetitive. This physical tightness will likely keep prices elevated above USD 3,000 per tonne, even as demand destruction threatens the automotive and construction sectors.

The priorities are clear. Every project must be evaluated against a 'carbon check'. Governments and companies will increasingly treat scrap as a strategic asset, leading to further export restrictions and the development of localised "closed-loop" recycling ecosystems.

Smelters must move away from volatile, carbon-heavy grids toward captive renewable sources or long-term hydro power purchase agreements (PPAs).

At the very least, aluminium smelter project approvals should now require a "carbon check"— Can this site compete in a USD 100 per tonne of CO_2 world?

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We thank the global aluminium community for their unwavering dedication and contributions to shaping industries and innovating possibilities

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GET IN TOUCH WITH OUR TEAM

www.alcirclebiz.com

+91 8100108283

info@alcirclebiz.com