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■ "The Future of Foundries Lies in Precision, Automation, and First-Time- Right Manufacturing"

Mr. Anil Shivajirao Kulkarni
Director,
Pooja Castings Pvt. Ltd.

■ In the Wonderland of Materials Technology – Article 2

■ India's Auto Industry Registers Robust Double- Digit Growth in February; SIAM Flags Supply Chain Risks Amid West Asia Tensions





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D.A. Chandekar
Editor

The Indian economy was on a roll, with the metals industry being a significant contributor to its growth story. The Prime Minister's recent assurance in Parliament that the country has sufficient 'strategic oil reserves' to weather the storm brought some relief, but the metal industry is already showing signs of slowing down. India's exports to the Gulf countries, a significant market for the industry, have been hit hard, and the ongoing conflict has disrupted global supply chains. The industry was poised to benefit from India's infrastructure push, but the uncertainty is taking a toll.

The rising crude oil prices in the international markets are a major concern, as they will increase logistics costs and affect the entire industry, including the metals sector. The government's ability to maintain current petrol

and diesel prices will be tested, and any increase will have a ripple effect on the economy. The metals industry, already grappling with high energy costs, is vulnerable to these developments. The situation is further complicated by the fact that global economic growth is also being impacted by the conflict. India's metal producers and processors are facing challenges on multiple fronts, including increased competition from imports and rising raw material costs. The scarcity of gas is the new challenge introduced by the ongoing conflict.

The world is hoping for a truce between the US, Israel, and Iran, but until then, the metals industry will have to navigate these choppy waters. The government's focus on promoting domestic manufacturing and infrastructure development will be crucial in mitigating the impact of the conflict. Initiatives like 'Atmanirbhar Bharat' and the National Infrastructure Pipeline could help the industry tide over the challenges. For now, the industry can only wait and watch how the situation unfolds, hoping for a swift resolution to the conflict and a return to stability in the global market. The metals industry's resilience will be tested, but with the right policies and support, it can emerge stronger.

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Mr. Anil Shivajirao Kulkarni is a seasoned entrepreneur and industry leader with over five decades of experience in aluminium die casting. He is the Director of Poojaa Precision Engg. Limited and Jayshree Pistons Pvt. Ltd., and has held key leadership roles, including Vice President of the Indian Foundry Organisation (IFO). He currently serves as Vice President of the Great Die Casting Technology Forum of India (GDC Tech).

Known for his strong focus on quality, innovation, and customer satisfaction, Mr. Kulkarni has been instrumental in building capabilities in precision casting and process excellence. He is also committed to knowledge sharing and has developed a widely recognised training programme, "Die Casting for Non-Die Casting People," which has been appreciated by leading OEMs.

Beyond industry, he has actively contributed to social initiatives in healthcare, education, and rural development. His journey from humble beginnings to becoming a respected industry expert reflects his dedication, resilience, and commitment to contributing to both industry and society.

"The Future of Foundries Lies in Precision, Automation, and First-Time- Right Manufacturing"

Mr. Anil Shivajirao Kulkarni
Director, Pooja Castings Pvt. Ltd.

THE INDIAN foundry industry has undergone a remarkable transformation over the past few decades, evolving from a largely manual and experience-driven sector to one that increasingly relies on precision engineering, automation, and digital technologies. In this edition of Foundry Face to Face, Mr. Anil Kulkarni, Director of Poojaa Precision Engg. Limited, shares insights drawn from over five decades of experience in aluminium die casting. He reflects on the industry's journey, the importance of process discipline, and the growing role of technology in shaping the future of foundry operations.

You Have been closely associated with the foundry industry for several years. How have you seen the evolution of the Indian foundry sector, particularly in terms of technology adoption and product quality?

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I have been associated with aluminium die casting for more than 50 years, and the transformation that the industry has undergone during this period has been truly significant. When I started in the 1980s, the die casting sector in India was still in a very early stage of development. Technology was limited, and access to advanced equipment was largely restricted to a few large companies that could afford imported machinery.

At that time, product quality standards were relatively basic compared to what we see today. Rejection levels of around 15–20 percent were considered acceptable by OEMs, which would be unimaginable in the current environment. Today, expectations have shifted dramatically, with rejection levels measured in parts per million, sometimes as low as 200 PPM. This shift reflects not only improvements in technology but also a change in mindset toward quality and process control.

Over the years, the industry has steadily adopted better machinery, improved tooling practices, and more scientific approaches to manufacturing. Automation, process monitoring, and better metallurgical control have all contributed to this evolution. Today, Indian foundries are capable of meeting global standards, both in terms of quality

and productivity, which was not the case a few decades ago.

Poojaa Precision Engg. Limited has built a strong presence in precision castings. What are the key factors that differentiate your operations in terms of quality, consistency, and process control?

At Poojaa Precision Engg. Limited, we believe that the foundation of quality lies in the early stages of product development. One of the key differentiators for us is our strong New Product Development (NPD) team, which plays a critical role in ensuring that products are designed and manufactured correctly from the very beginning.

Our approach is to closely study customer requirements and drawings, and wherever necessary, suggest design improvements that enhance manufacturability without affecting functionality. This proactive involvement helps us deliver products that are “first time right,” reducing the need for repeated trials and corrections.

Consistency and process control are achieved through a combination of experience, disciplined operations, and continuous improvement. Our team focuses on eliminating variability at every stage of production, ensuring that each

“Aluminium usage in vehicles was limited, but today it has expanded considerably due to the need for lightweighting, improved fuel efficiency, and better performance.”





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component meets the required specifications. Over time, this approach has helped us build confidence with customers by delivering reliable and defect-free products.

With increasing demand from sectors such as automotive, engineering, and exports, how is the foundry industry adapting to meet higher performance and specification requirements?

The foundry industry, particularly in die casting, has adapted significantly to meet the evolving requirements of sectors such as automotive and engineering. These industries demand higher precision, tighter tolerances, and consistent performance, which has driven foundries to upgrade both their technology and processes.

One of the most notable trends is the increasing use of aluminium in automotive applications. Earlier, aluminium usage in vehicles was limited, but today it has expanded considerably due to the need for lightweighting, improved fuel efficiency, and better performance. In fact, the industry is now moving toward large-scale aluminium components, including structural parts.

Recent developments, such as the use of large single-piece aluminium die castings in automotive structures, indicate the direction in which the industry is heading. These advancements require not only advanced machines but also a deep understanding of process control and material behaviour.

To meet these demands, foundries are investing in better equipment, improving tooling design, and adopting advanced quality control practices. The focus has shifted from simply producing castings to delivering engineered solutions that meet stringent application requirements.

Energy efficiency and cost optimisation remain critical for foundries. What measures can foundries adopt to improve operational efficiency while maintaining product quality?



Energy efficiency has become an important consideration for foundries, both from a cost perspective and in response to environmental concerns. Fortunately, advancements in equipment have made it possible to achieve better efficiency without compromising on quality.

Modern furnaces, for example, are far more energy-efficient compared to earlier systems. They offer better control over melting processes and reduce energy consumption per tonne of metal produced. Similarly, newer die casting machines are designed to optimise energy usage while maintaining high levels of productivity.

However, equipment alone is not sufficient. Operational discipline, proper maintenance, and process optimisation are equally important. Foundries must focus on reducing waste, improving yield, and ensuring that machines operate at optimal efficiency. Even small improvements in these areas can lead to significant cost savings over time.

Ultimately, achieving energy efficiency is a combination of adopting the right technology and ensuring that processes are executed with consistency and control.

“ Modern furnaces, for example, are far more energy-efficient compared to earlier systems. They offer better control over melting processes and reduce energy consumption per tonne of metal produced. ”



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The industry is gradually moving towards greater automation and digitalisation. How do you see technologies such as process monitoring, data analytics, and advanced simulation shaping the future of foundry operations?

Technology is now at the heart of modern foundry operations. In my view, it is no longer optional—digitalisation and automation are essential for survival in today's competitive environment.

One of the most impactful developments has been the use of simulation tools. At Poojaa Precision Engg., simulation plays a key role in product development, enabling us to predict outcomes with a high degree of accuracy. This significantly reduces the need for trial-and-error methods that were commonly used in the past, saving both time and material.

Automation has also transformed shop-floor operations. Today, automation is widely used across various stages of die casting, from material handling to finishing processes. Importantly, these technologies have become more affordable, making them accessible even to medium-sized foundries.

Another example of technological advancement is in quality control. Earlier, analysing chemical composition was a time-consuming process that

could take an entire day. Today, spectrometers provide real-time analysis with high accuracy, enabling faster decision-making and improved process control.

Looking ahead, technologies such as data analytics and real-time monitoring will further enhance operational efficiency by providing actionable insights. Foundries that embrace these technologies will be better positioned to improve quality, reduce costs, and remain competitive in the global market.

From a policy and regulatory perspective, what support or interventions are required from policymakers to strengthen the competitiveness and growth of the Indian foundry industry?

The government has already taken several positive steps in recent years, particularly in areas such as labour reforms. However, there is still scope for further support to strengthen the growth and competitiveness of the foundry industry.

industry.

One important area is infrastructure development, especially in rural and semi-urban regions. By encouraging industries to move beyond urban centres and providing adequate infrastructure, the government can promote balanced industrial growth while reducing congestion in cities.

In addition, providing incentives for new investments and technology adoption can help foundries upgrade their capabilities and compete more effectively in global markets. Policies that support skill development and training will also play a key role in ensuring the availability of a capable workforce.

With the right support framework, the Indian foundry industry has the potential to grow significantly and establish itself as a global manufacturing hub. ■

“ The government has already taken several positive steps in recent years, particularly in areas such as labour reforms. However, there is still scope for further support to strengthen the growth and competitiveness of the foundry industry. ”





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Casting a Legacy: The Life and Achievements of Dr. P. N. Bhagwati

From the foundry floor to global leadership, Dr. Bhagwati's life exemplifies resilience, innovation, and values-driven enterprise.

Revered as the Father of the Indian Foundry Industry, his journey demonstrates how knowledge, integrity, and perseverance can transform both industry and society.

Born on February 11, 1936, in Mumbai, Dr. Bhagwati was the youngest of seven sons in a family deeply committed to learning and public service. Guided by his parents, he developed a strong moral compass and an enduring respect for education, principles that shaped his life's work.

An exceptional academic, he studied at St. Xavier's High School, Mumbai, and the College of Engineering, Pune, before pursuing advanced studies in Germany. At RWTH Aachen University, he earned a Ph.D. in Foundry Engineering, conducting pioneering research in alloy steel casting and spheroidal graphite (SG) iron. His early professional experience at Sulzer Brothers Foundry in Switzerland further strengthened his technical depth and global perspective.

Returning to India in 1964, Dr. Bhagwati chose Ahmedabad as

the base for his ambitions. Alongside his wife and life partner, Mandakini, whom he married in 1965, he embarked on an entrepreneurial journey, built not on capital, but on knowledge and conviction. His innovations enabled complex, high-nickel castings for national infrastructure projects and introduced SG iron and affordable magnesium-ferrosilicon alloys to the Indian market.

His vision took institutional form with the founding of Bhagwati Spherocast in 1977, followed by Bhagwati Autocast, Bhagwati Filters, and Rinal Machining—each reinforcing India's growing strength in advanced metallurgy.

Beyond business, Dr. Bhagwati was a tireless institution builder and industry leader. His leadership extended to the national and global stage through the Confederation of Indian Industry (CII), where he served from Western Region Chairman to National Council contributor and led skill development initiatives in collaboration with UNIDO. Internationally, as President of the Institute of Indian Foundrymen in 1997 and of the World Foundry Organization in 2006, underscored his global

influence and respect. His contributions were recognized with numerous honors, including Lifetime Achievement awards and the title "Iron Man of the Indian Foundry Industry." His commitment to education found lasting expression in the Foundry Trade Center at ITI Kubernagar and the Center for Foundry Education and Research, nurturing generations of skilled professionals.

Equally profound was his commitment to philanthropy. Dr. Bhagwati and his wife dedicated themselves to education, healthcare for the underprivileged.

A man of many passions, he lived life beyond work with equal enthusiasm; painting over 400 artworks, nurturing a lifelong love for jazz, books, theater, travel, and culinary exploration.

These pursuits brought balance, creativity, and joy to a life defined by purpose.

As we honor and remember Dr. Bhagwati, we celebrate not just an extraordinary industrialist, but a teacher, mentor, philanthropist, artist, and visionary who built enterprises, institutions, and futures, casting a legacy that continues to inspire generations.

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Dr. Ing. Pravin Bhagwati

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Known as The Iron Man and a Visionary Leader of the Indian Foundry Industry,
we celebrate a life lived wonderfully well and a legacy that endures.

A visionary whose work shaped an industry and whose character
shaped countless lives.

*May his memory be a blessing, and may his life continue to inspire
all who follow.*



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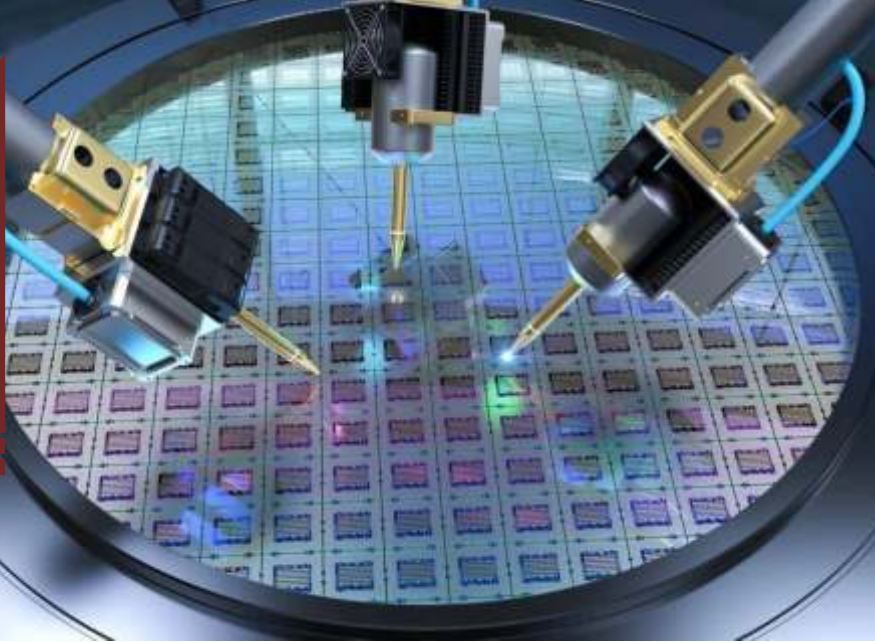
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In the Wonderland of Materials Technology – Article 2

The science, technology, applications & geopolitics of Rare Earths-Part 2



Sadguru Kulkarni
Chemical Engineer
UDCT

Sadguru Kulkarni, Chemical Engineer from UDCT (now ICT), with over four decades of experience in industrial research & technology, covering chemicals, metals, minerals and materials, and specializing the technology transfer. Mr. Kulkarni worked for two large multinational Research Centres for over four decades. He is an avid writer on science & technology, and has received awards from Marathi Vidnyan Parishad for -science fiction in Marathi.

IN PART 1 of this article we had a look at what Rare Earth Elements are, what are the important applications of these REEs, how and why they are closely linked to the modern technologies like mobiles, solar energy, clean technology & sustainability, battery technology, electric mobility etc. We also had an overview of the demand & supply situation of REEs. In part 2 of the article, we will find out where these REEs occur, in what form, who are the major stakeholders in the rare earth stocks, what are some of the manufacturing technologies to process these Rare Earth minerals, what is the present geopolitical situation with respect to REEs, are there options etc.

Geopolitical Factors of Relevance to Rare Earth Elements

Rare earth elements (REEs), a group of 17 metallic elements critical to modern technology, have shifted from obscure geological curiosities to central drivers of geopolitical competition. Their importance arises from indispensable roles in defence

systems, renewable energy technologies, and advanced electronics, paired with highly concentrated global supply chains. This paper examines the key geopolitical factors shaping rare earth dynamics in the 2020s, with special attention to supply concentration, strategic leverage, trade policies, and emerging responses from governments worldwide.

Strategic Importance and Technological Dependence

Rare earth elements are critical to a wide range of industrial and military applications, including permanent magnets for electric motors, precision-guided munitions, wind turbines, and consumer electronics. Despite a relatively small global market value compared to commodities like oil or copper, the unique properties of REEs make them essential inputs for advanced technologies. Their limited substitutability amplifies strategic concerns for nations seeking technological leadership and defence readiness.

China's Dominance and Geopolitical Leverage

Historically, China has cemented a dominant position in the global REE market. China as a country holds over 48% of proven sources of REEs and hence it controls a substantial share of mining. China also has , refining, and high-end processing capacity, around 60-70% of mined output and over 80-90% of global processing and magnet manufacturing capacity. This concentration reflects decades of state support, low environmental regulation, and targeted quotas that effectively regulate global supply. The names of some of the state-supported REE processing plants in China are: China Northern Rare Earth High tech Co Ltd, based in Mongolia-

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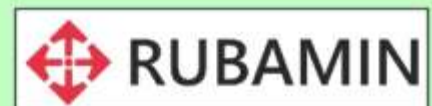
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dependence on China. Australia & Other Resource-Rich States, which are the second largest resource of REEs globally, are positioning themselves as alternative suppliers. Some governments are considering non-market interventions, including subsidies and strategic stockpiles, to reshape global supply networks. These geopolitical moves reflect a broader reorientation of global supply chain policies—shifting from cost-efficiency to strategic resilience as technological competition intensifies.

In conclusion, Rare Earth elements occupy a unique niche in the geopolitics of the 21st century: small in trade value yet central to technological prowess and national security. China's historical dominance provides it with strategic leverage that has been repeatedly employed as a geopolitical tool, prompting major powers to pursue diversification and resilience strategies. Given accelerating

demand from clean energy transitions and digitalization, the geopolitical competition over REEs can be expected to intensify, with implications for global alliances, industrial policy, and international trade norms.



Rare Earth Elements in News: Across the world....Strategic Importance

In last few months, Greenland, the biggest island in the world, located between the Northern Atlantic Ocean and the Arctic Ocean, owned by Denmark, has come into limelight for its Rare earth Reserves and other mineral resources. Greenland has significant, vast deposits of rare earth elements (REEs) and other critical minerals (like lithium, graphite, copper & zinc), ranking among the world's largest reserves, particularly at sites like Kvanefjeld and Tanbreez. The geological and climatic conditions in Greenland however make these deposits largely untapped due to logistical, environmental (including uranium content). Its mineral wealth, including REEs vital for clean energy tech and high-tech magnets, is

becoming more accessible with melting ice, attracting international interest despite mining hurdles. At present the situation is highly fluid and we will wait and watch it.

India is fortunate in that it holds significant deposits of rare Earth Elements. Geological Survey of India (GIS) has declared 482.6 million T of RE ore sources. India's Union Budget 2026-27 has announced creation of dedicated Rare earth Corridors in Odisha, Kerala, andhre and Tamil Nadu. Facilities for mining, processing, R&D and downstream manufacturing of REEs will be created. This will focus on REMS- Rare Earth Magnets with a budget of Rs 7280 Cr to create a manufacturing facility of 6000 TPA of Rare earth Magnets. 6,000 MTPA integrated REPM capacity to be created. Sales linked incentives worth Rs 6450 Cr have been planned. A capital subside of Rs 750 cr has been provided for this facility.

Manufacturing Processes for Recovery of Rare Earth Materials

We now understand that mineral resources and mining activities for Rare earth elements (REEs). The final usable form of the REEs is as high purity elements used for alloying, and it requires multistep mineralogical, physical and chemical processing of the ores. .

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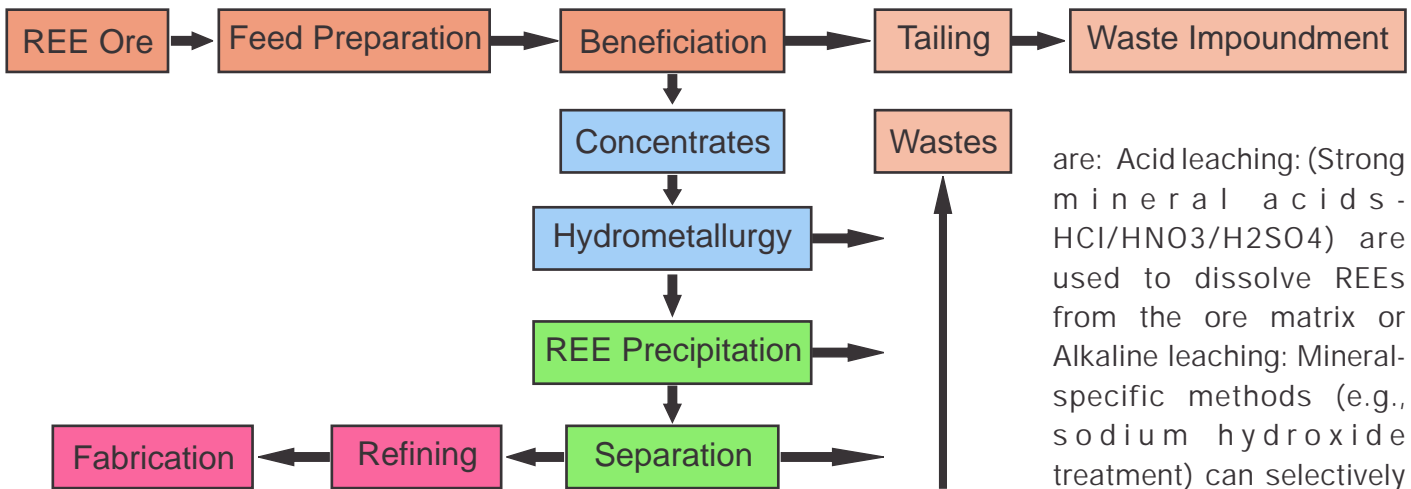
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(Ref: Terry McNulty, Nick Hazen&Sulgiye Park, 'Processing the ores of rare-earth elements', MRS Bulletin, Vol 47, (3-2022) pp258-66 March 2022)

are: Acid leaching: (Strong mineral acids - HCl/HNO₃/H₂SO₄) are used to dissolve REEs from the ore matrix or Alkaline leaching: Mineral-specific methods (e.g., sodium hydroxide treatment) can selectively dissolve REE phosphates such as monazite, while leaving thorium and uranium behind.

The aqueous solution resulting from leaching contains a mixture of REE ions and other dissolved metals.

1. Mining and Ore Preparation

The recovery process begins with mining the rare earth-bearing ore. REE ores such as bastnäsite, monazite, and lateritic deposits are extracted via open-pit or underground mining methods. Once mined, the ore is stockpiled and undergoes crushing and grinding to liberate REE-bearing minerals from the surrounding waste rock. The goal at this stage is to reduce particle size and prepare the material for subsequent beneficiation. The general flow diagram is as given below:

2. Ore Beneficiation

Because most natural ores contain 0.5 to less than 10 % rare earth oxides (REO), beneficiation is necessary to concentrate the REE minerals. Physical separation techniques include: Gravity separation, Magnetic Separation &/or floatation. These techniques produce a REE concentrate-typically containing 60 % or more REO-suitable for chemical processing.

3. Hydrometallurgical Processing-

After physical concentration, the REE minerals are subjected to hydrometallurgical treatment, where chemical leaching dissolves the valuable elements into solution. Two common approaches



4. Separation and Purification:

Because rare earth elements are chemically similar, separating them into individual elements is technically challenging and the most complex part of the process: Solvent extraction: (A multi-stage liquid-liquid extraction technique where organic solvents selectively bind and transfer specific REE ions from one aqueous phase to another. This method is widely used industrially to produce light and heavy rare earth fraction) and/or Ion exchange: Solid resins selectively bind REE ions and release them in a controlled sequence. Ion exchange can achieve very high purities, though it is slower and more laborious than solvent extraction. Once separated, individual REEs are precipitated (often as oxalates or carbonates) and calcined to yield high-purity oxides.

5. Refining and Metal Production:

The purified rare earth oxides (e.g., Nd₂O₃, Pr₆O₇) serve as intermediates for metal production. Typical refining steps include: Reduction to metals: Oxides are reduced, often via molten salt electrolysis, to produce elemental rare earth metals. This is followed by Alloying: Rare earth metals are alloyed with iron, boron, and other elements to produce magnetic alloys (e.g., Nd-Fe-B). And Powder processing and sintering: These alloys are processed into powders and sintered into magnets or other engineered components.

The manufacturing process for recovering rare earth materials is a highly sequenced combination

of physical and chemical operations. Starting from mined ore, beneficiation concentrates the rare earth content, while hydrometallurgy and advanced separation methods isolate individual elements. The final refining and metallurgical conversion steps produce the metals and alloys essential for high-tech applications. Developing environmentally less intensive and more cost-effective variations of these processes remains a key research and industrial priority.

Trends in Recycling of Rare Earth Materials:

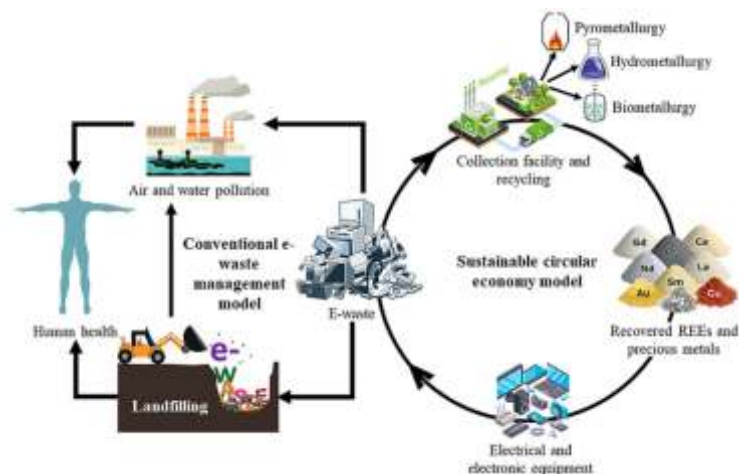
With ever-increasing demand for REEs especially for high end applications in smart gadgets, alternative energy, climate change, etc, the subject of sufficiency of REEs has been often discussed. The proven and projected stocks of REEs are estimated to last for sixty to one hundred years only. The geopolitical situation and new applications may make the situation worse. The technological approach to resolve this is to start effective recycling of REEs. As of today, only one percent of the REEs are recycled, mainly due to logistical issues in collection and segregation, many gadgets not yet reaching their 'end of life', as well as poor technology development

annually once systems scale. This provides a future opportunity for a start up industry.

The main technological opportunities can be seen in: development of Hydrometallurgical & membrane methods: Advanced solvent or membrane extraction techniques are being commercialized to increase selectivity and yield of individual rare earths from mixed end-of-life sources; Automated sorting & pre-treatment: Machine learning and sensor-based e-waste sorting improves feedstock purity and reduces downstream costs and Circular economy mandates: Policies in the EU and Asia aim to recycle 25 % or more of critical materials by 2030, significantly pushing recycling adoption. Opportunities can be seen in: Industrial magnet recycling: (Processors are targeting NdFeB magnets from EV motors and wind turbines, a high-value source); and Integration with battery recycling: Synergies between REE and battery recycling chains enhance overall material recovery economics. As of 2026, the major countries working on REE recycling technologies are: China, Japan (Hitachi Metals - magnet and catalyst recycling solutions), US (ReElement Technologies - high-purity separation and refining), EU -France & Belgium(Solvay/Rhodia - hydrometallurgical recovery in Europe) and Canada (Geomega Resources - bioleaching and metallurgical extraction technologies and Cyclic Materials-Canada - facility backed by Amazon/Microsoft investment.). The focus on technology can also be evident from the increasing number of patents on recycling of REEs. Based on recent analysis, there were over 3,800 patent applications for rare earth element (REE) recycling filed globally between 2010 and 2022, with a significant increase in activity. Key findings indicate that while China leads in the number of applications, the US and Japan hold high-value patents.



for recycling. Reported market research indicates that the rare earth recycling industry is still small, but growing. Total market value is expected to reach around US \$0.6 billion by 2025, expanding at a CAGR of ~5.7 % through 2034. The main recycle areas are: Asia-Pacific accounted for ~52 % of recycled REE volume, Electronics and magnet scrap dominated feedstocks, Permanent magnets represented nearly half of recovered material demand. Despite small current volumes relative to primary supply, the potential recycled pool from consumer electronics, electric vehicle motors, and wind turbine magnets is large - estimated at tens of thousands of tonnes



- Total Volume: Approximately 3,821 patent applications were filed globally from 2010 to 2022, with a sharp increase in activity between 2010 and 2018.

- Key Trends: The field is characterized by rapidly growing interest and intense technological competition, especially in recovering REEs from E-waste.

- Leading Regions: China is the most active in filing patent applications, particularly from universities. However, the United States leads in the number of patent families focused on extraction technologies, with Japan also being a major contributor.

- Top Technologies: Technologies covered include hydrometallurgy, pyrometallurgy, and bioleaching to recover rare earth metals from end-of-life products.

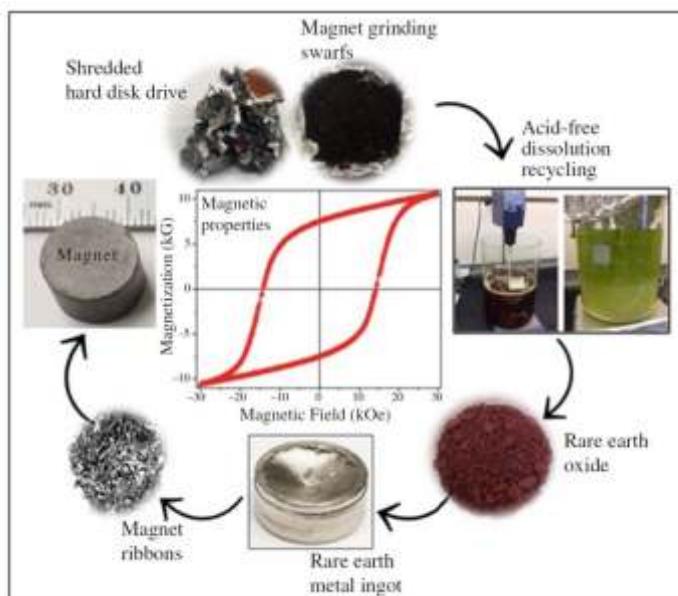
The patent activity, heavily focused on E-waste, reflects rising economic and strategic interest in establishing a secure, alternative supply chain for REEs outside of primary mining. Examples of top five important patents on REE recycling are:

US8734714B2 – Magnet Recycling via Hydrogen Decrepitation: Recovers particulate rare earth material from assembled magnets by hydrogen decrepitation.

US10323300 / US11250980 – Recycling of Rare Earth Magnets & Systems for Magnet Recycling: Methods and apparatus for separating rare earth materials from magnets at scale.

US10323299B2 – Recovering Rare Earth Metals from Magnet Scrap: Liquid metal extraction techniques for permanent magnet scrap.

US11293078B2 – Supported Membrane Solvent Extraction: Membrane methods for



separating mixed rare earths recovered from recycled sources.

US5437709A – Liquid Metal Extraction of RE Alloys: Early liquid metal extraction to recover rare earths from alloy scrap and waste.

Summary & Conclusion:

- Rare earth Elements have been invented over hundred years ago. However recent have led to increased importance of REEs.

- These factors include: discovery of unique properties of Rare earths to impart special effects. For example: Incorporation of Nd enhances the magnetic properties of permanent magnets; Use of Rare Earths help produce touch sensitive glass screens, used in smart screens; combination of some REEs in glass helps produce TV screens with enhanced colour effects; REE based catalysts help in almost complete combustion of fuels, and reduce pollution. Rare Earth magnets have enhance wind mill productivity; and better electric vehicles for cleaner technology.

- The availability of minerals and ores containing Rare Earth Elements is poor. Only a few countries hold economically extractable REEs.

- China has the privilege to have the highest quantum of REE mineral deposits; and China has a political strategy to control REE supply to the world.

- This has also lead to a race for identifying, and processing REE deposits among various partner countries. As a reaction, 'resource nationalism'-(controlling mineral deposit supply to other countries and initiating value addition steps within the country of origin) has taken a lead, often causing political tension across the globe.

- Technology development initiatives to identify and own processes for recovery of purified rare earths and downstream products have taken a priority. Number of patents in the field have shown an upward trend.

The first article in the series (The science, technology, applications & geopolitics of Rare Earths-Part 1, MetalworldTM Jan 2026, pp:), introduces Rare Earth Elements, their place in the periodic table, occurrence and distribution, applications and rising importance for sustainable businesses, electric vehicles, smart gadgets, climate change and clean energy etc.

Gargi HA Showcases Technologies and Strengthens Industry Engagement at IFEX 2026



GARGI HA marked a strong presence at the 74th Indian Foundry Congress (IFC) and IFEX 2026, held in Mumbai, with its stall serving as a key interaction point for foundry professionals from across India and overseas.

Located at Stand No. B2, Hall 6, the Gargi HA pavilion attracted significant visitor engagement over the three-day event. The stall functioned as an active meeting hub, where the company's sales team and management interacted with a large number of delegates, exchanging insights on foundry technologies, materials, and evolving industry requirements.

Spread across an area of approximately 324 square metres, the exhibit featured participation from nearly 50 team members, reflecting the company's focus on strong industry engagement. The display highlighted several case studies from key customers, alongside information on new and upcoming products within Gargi HA's portfolio. These presentations provided visitors with practical insights into applications and

performance outcomes across various foundry processes.

A key highlight of Gargi HA's participation was its technical contribution to the conference. Christian Fourberg, Global Product Manager – No Bake Systems, presented papers on "Low Emission Furan No-Bake Binder Systems" and "Running an Olivine Mono Sand System in Ester Cured No-Bake." The presentations were well received for their practical relevance and global perspective, addressing current industry concerns related to emissions and process optimisation.

In addition, Klaus Oosterhof, Business Development Manager, participated as a panellist at the World Foundry Forum, contributing to discussions on global trends and developments in the foundry sector. This further reinforced the group's engagement with broader industry dialogue.

The event also saw participation from senior representatives of HA Group and its associated companies. From HA GmbH, key attendees included Siamak Djafarian (Managing Director),

Bernhard Mueller (Regional Vice President - Asia & Pacific), Markus Schabrucker (Director - Product & Application Management), Iryna Werners (Director - Global Sales), and Peter Groning (Global Product Manager - Cold Box Systems). From Chemex Foundry Solutions GmbH, Lars Zumbusch (Managing Director) and Georg Grassl (Global Product Manager) were also present. The team engaged with visitors on various solutions related to resins, coatings, and sleeves, sharing international experience and application knowledge.

From the Indian operations, Gaurav Kapur (CEO), Gurinder Singh (CFO), and Varun Kapur (COO), along with Chandan Panda (Sales Director), led customer interactions and discussions. The presence of cross-functional teams from sales, procurement, and R&D contributed to meaningful technical exchanges and strengthened customer engagement during the exhibition. Gargi HA also partnered with Omega Foundry Machinery Ltd., U.K. and Omega Sane Foundry Machinery Ltd., Pune, further expanding the scope of its display and collaborative outreach at the event.

Overall, Gargi HA's participation at IFEX 2026 reflected its continued focus on technology development, customer interaction, and knowledge sharing within the foundry industry. The event provided an effective platform for engaging with stakeholders and reinforcing its presence in both domestic and international markets. ■

Hindustan Zinc and Tata Steel Expand Collaboration on Low-Carbon Zinc Solutions



HINDUSTAN ZINC Limited has strengthened its long-standing partnership with Tata Steel to expand the adoption of EcoZen, its low-carbon zinc product, in steel manufacturing applications. The development reflects a broader industry shift towards reducing emissions across the metals value chain through sustainable raw materialsourcing.

EcoZen, positioned as Asia's first low-carbon zinc, is produced using renewable energy and has a verified carbon footprint of less than one tonne of CO₂ equivalent per tonne of zinc. This represents a reduction of approximately 75% compared to the global industry average. The use of such low-carbon inputs at the raw material stage enables downstream industries to significantly reduce overall value-chain emissions.

Zinc plays a critical role in galvanising steel, providing corrosion protection and extending service life across sectors such as infrastructure, automotive, renewable energy, and engineering applications. Since zinc coatings contribute to the embedded carbon footprint of galvanised steel, the use of lower-carbon zinc can have a measurable impact. According to estimates, the adoption of EcoZen can help avoid nearly 400 kg of CO₂ emissions per tonne of galvanised steel when compared with conventional zinc, offering a practical pathway for reducing Scope 3 emissions.

Commenting on the development, Mr. Arun Misra, CEO, Hindustan Zinc Limited, noted that the introduction of EcoZen aligns with the company's focus on delivering sustainable metal solutions. He highlighted that the collaboration

with Tata Steel represents a step forward in scaling the adoption of low-carbon zinc and strengthening environmentally responsible supply chains.

From Tata Steel's perspective, the initiative reflects an increasing emphasis on sustainable procurement practices. Mr. Ranjan Sinha, Chief Procurement Officer, Tata Steel, acknowledged the integration of EcoZen into operations at the company's Sahibabad plant, noting that such collaborations support the advancement of green technologies within the supplier ecosystem.

Hindustan Zinc and Tata Steel have maintained a strategic partnership for over two decades, supporting a range of industrial and infrastructure applications. The expanded engagement under the EcoZen initiative builds on this association by incorporating sustainability and decarbonisation objectives into the partnership.

The collaboration also aligns with broader industry efforts to reduce emissions across the steel value chain, particularly through responsible sourcing and improved material efficiency. By integrating low-carbon zinc into steel production, both companies aim to contribute to climate-aligned procurement frameworks and support India's transition towards a more sustainable industrial ecosystem.

MAGMA Engineering India Showcases Casting Simulation Solutions at IFEX 2026



MAGMA ENGINEERING India Pvt. Ltd. participated in the 74th Indian Foundry Congress (IFC) and IFEX 2026, held at the Bombay Exhibition Centre (NESCO), Mumbai, presenting its latest developments in casting process simulation and optimisation technologies.

Located at Hall 6, Stall D3, the MAGMA pavilion attracted steady visitor engagement throughout the three-day event. The stall was designed to highlight the growing role of simulation technologies in improving casting quality, efficiency, and process control across foundry operations.

The exhibit featured demonstrations of MAGMASOFT®, the company's casting simulation software, with a focus on its application across a wide range of processes. Visitors were introduced to how simulation-driven approaches can help address key industry challenges such as defect reduction, yield improvement, and optimisation of production parameters.

The MAGMA team engaged with a large number of industry professionals, including foundry engineers, production specialists, and decision-makers, facilitating technical discussions on process optimisation and digitalisation in foundries. Dedicated discussion areas within the stall enabled in-depth interactions, supported by live demonstrations on advanced workstations.

A key highlight of the participation was the demonstration of MAGMASOFT® version 6.1, which incorporates enhanced features aimed at improving simulation accuracy and expanding application capabilities. The software modules showcased during the event covered a broad spectrum of casting processes, including iron, steel, high-pressure die casting (HPDC), low-pressure die casting (LPDC), gravity die casting (GDC), as well as applications related to die life, core and mould behaviour, stress analysis, continuous casting, and

heat treatment.

The demonstrations provided visitors with insights into how integrated simulation tools can support more informed decision-making, reduce trial-and-error in production, and improve overall process reliability.

In addition to industrial applications, MAGMA also highlighted its engagement with the academic and training ecosystem through MAGMA Academy. The initiative focuses on knowledge development and skill enhancement, with the team interacting with students and academic professionals during the event to promote learning in casting simulation and digital engineering.

The stall design incorporated audio-visual presentations and interactive displays to explain the capabilities of simulation-driven optimisation. These elements helped visitors understand the practical impact of such technologies in real foundry environments.

Overall, MAGMA Engineering India's participation at IFEX 2026 reflected the increasing adoption of digital tools and simulation-based methodologies in the foundry industry. The event provided a platform for the company to engage with industry stakeholders, demonstrate its technological capabilities, and contribute to discussions on improving casting efficiency and quality through advanced engineering solutions.

Jingye (Yingkou) Selects SMS group to Upgrade Wire Rod Line



JINGYE (YINGKOU) Medium Plate Co. Ltd. has awarded a contract to SMS group for the modernization of its No.1 high-speed wire rod line at the Yingkou plant in China. The upgrade will expand the line's product diameter range, enhance production capacity, and improve product quality for high-grade specialty steels. Commissioning of the upgraded line is scheduled for the fourth quarter of 2026.

Following the modernization, the facility will be capable of producing smooth rounds with diameters ranging from 5 to 25 millimeters as well as rebars in the 6 to 16 millimeter range. The expanded capability will enable Jingye to manufacture a wider portfolio of value-added steel grades, including high-carbon steels, tire cord, welding wire, cold-heading, spring, tool, bearing, and free-cutting steels.

The modernized line is designed for a benchmark maximum rolling speed of 115 meters per second, which is expected to set new rolling speed benchmarks in China. The upgrade is intended to enhance production efficiency while strengthening

Jingye's ability to respond to evolving market demand, particularly in the automotive and specialized steel segments.

Rolling Technology Upgrade

The modernization project builds on the existing SMS high-speed wire rod line that was installed in 2012. The upgrade will include the integration of a core rolling system comprising an eight-stand finishing block and a four-stand MEERdrive®PLUS sizing block.

The finishing block features a V-type topcross 45-degree arrangement, enabling twist-free rolling and contributing to high dimensional accuracy and improved surface quality. Tungsten carbide rings are used to extend service life and allow quick replacement using hydraulic tools. In addition, roll gaps can be adjusted synchronously and symmetrically through screws and eccentric sleeves, helping maintain consistent tolerances during production.

Independent Drive Concept for Sizing

The MEERdrive®PLUS sizing block incorporates SMS group's patented independent-drive

concept for wire rod rolling. Each stand is powered by its own motor and equipped with a gearbox offering multiple selectable ratios. This configuration allows operators to select optimal rolling programs through the human-machine interface (HMI), supporting efficient operation under demanding production conditions.

The system employs an "oval-round-round" pass sequence combined with flexible independent speed control, enabling tight dimensional tolerances and consistent product quality across different sizes and steel grades.

Process Support and Local Service

In addition to supplying the equipment, SMS group will provide process optimization support as well as operational and technical training to facilitate smooth ramp-up and stable production after commissioning.

The company will also support the project through its local spare parts warehouse in Shanghai and a dedicated technical service team, ensuring rapid response and long-term operational support.

Continuing Long-Term Cooperation

The modernization project further strengthens the cooperation between Jingye (Yingkou) and SMS group, which began in 2012 with the installation of four identical parallel wire rod lines designed for high-volume production. The new upgrade builds on that partnership and is expected to further enhance the plant's operational capabilities. ■

Anil Agarwal Calls for Accelerated Mining Reforms to Strengthen India's Resource Security



ANIL AGARWAL, Chairman of Vedanta Limited, has called for faster operationalisation of auctioned mining blocks in India, highlighting the need to strengthen mineral security, reduce import dependence, and unlock employment potential across the sector.

In a recent LinkedIn post, Agarwal noted that while the government has made significant progress in auctioning mineral blocks over the past decade, a large number of these assets remain non-operational. He pointed out that only a small proportion of the 592 auctioned blocks are currently producing, limiting India's ability to fully utilise its natural resource base at a time when global energy and mineral security have become increasingly important.

Agarwal emphasised that natural resources play a critical role in economic growth and strategic resilience, particularly in the current global context. He highlighted that a substantial portion of India's import bill is linked to mineral and energy resources, underlining the importance of strengthening domestic production capabilities.

According to Agarwal, three key challenges are delaying the operationalisation of mining blocks: difficulties in land acquisition, delays in securing environmental and forest clearances, and high premiums in certain auctions that impact commercial viability.

To address these issues, he suggested the adoption of technology-driven approaches to streamline land acquisition processes, including systems

that enable direct and transparent compensation to landowners. He also recommended simplifying regulatory approvals through trust-based frameworks and self-certification mechanisms, where appropriate, to reduce delays.

In addition, Agarwal proposed that auction premiums be structured at commercially viable levels to ensure sustainable project development. He stressed that once mining blocks are allocated, on-ground operations should commence without significant delays.

Highlighting India's long-term potential, Agarwal stated that the country has the resources and capabilities to emerge as a global hub for minerals, metals, and hydrocarbons. He also noted that the sector could play a significant role in generating employment, including opportunities for women, while contributing to broader economic development.

The call for reform comes at a time when the mining sector is increasingly being viewed as a strategic pillar for achieving self-reliance and supporting India's industrial growth.

Zinc Smelters Focus on Energy Optimization to Improve Cost Competitiveness

ZINC SMELTERS worldwide are intensifying efforts to optimize energy consumption as power costs continue to influence production economics. Electrolytic zinc production is highly energy-intensive, making electricity pricing a critical factor in determining operational profitability.

Producers are adopting advanced energy management systems to monitor and control consumption across roasting, leaching, purification, and electrowinning stages. Real-time data analytics is enabling smelters



to identify inefficiencies and implement targeted improvements. Several facilities are also exploring renewable energy integration and long-term power sourcing strategies to stabilize input costs. In regions with access to hydropower or solar

energy, producers are leveraging these advantages to enhance competitiveness.

Process improvements aimed at increasing current efficiency and reducing energy losses are also gaining traction. Upgrades to cell design and electrolyte management systems are contributing to better

recovery rates and lower power consumption per ton of zinc produced. Industry analysts note that energy efficiency will remain a key differentiator among zinc producers in 2026, particularly as global markets remain sensitive to cost fluctuations. ■

Zinc Producers Strengthen Output Strategy Amid Stable Galvanizing Demand



GLOBAL ZINC producers have entered March 2026 with a stable production outlook, supported by consistent demand from the galvanizing sector. Zinc continues to play a critical role in corrosion protection for infrastructure, construction, and industrial applications, ensuring

steady baseline consumption. Industry participants report that galvanizing demand has remained resilient across emerging markets, particularly in infrastructure and transmission-related projects. This has supported zinc offtake despite moderate fluctuations in broader industrial activity.

Producers are focusing on maintaining operational efficiency through improved smelting practices and energy optimisation. Given the energy-intensive nature of zinc refining,

cost management remains a key priority. Several smelters are investing in digital monitoring systems to optimise furnace performance and improve recovery rates.

Recycling is also contributing significantly to zinc supply. Secondary zinc recovery from galvanised scrap and industrial residues is helping balance primary production, particularly in regions with established recycling infrastructure. Analysts expect zinc demand to remain stable through 2026, with infrastructure and industrial maintenance continuing to anchor consumption. ■

Lead-Acid Battery Market Remains Resilient Amid EV Transition



DESPITE THE growing adoption of lithium-ion batteries, the lead-acid battery market continues to demonstrate resilience across several applications. Automotive starting batteries, industrial backup systems, and telecom infrastructure continue to rely heavily on lead-acid technology. Replacement demand remains a key driver, as lead-acid batteries have relatively shorter life cycles compared to lithium-based alternatives. This ensures consistent consumption of

refined lead, particularly in developing markets.

Industrial applications, including uninterrupted power supply (UPS) systems and data centers, continue to depend on lead-acid batteries due to their reliability and cost-effectiveness. In addition, renewable energy installations in off-grid and hybrid systems often use lead-based storage solutions. Industry participants highlight that the established recycling ecosystem for lead-acid batteries provides a strong advantage in terms of material recovery and sustainability.

While long-term growth may be influenced by evolving battery technologies, lead is expected to remain a significant component of the global energy storage and automotive ecosystem through 2026. ■

Alloy Development Enhances Performance of Lead and Zinc Applications

INNOVATION IN alloy development is expanding the application range of both lead and zinc in industrial and engineering sectors. Improved alloy formulations are enabling better performance characteristics such as corrosion resistance, mechanical strength, and thermal stability.

Zinc-based alloys are widely used in die casting, offering excellent fluidity and surface finish. Continuous improvements in alloy composition are helping manufacturers produce components with enhanced durability and precision. Lead alloys continue to find applications in batteries, radiation shielding, and specialized industrial uses. Alloying elements are being used to improve mechanical properties and extend service life.

Research and development efforts are also focused on reducing environmental impact while maintaining performance standards. New alloy systems are being designed to meet evolving regulatory and sustainability requirements.

Industry observers note that alloy innovation remains a key driver for value addition in the non-ferrous sector, supporting both performance enhancement and application diversification. ■

Lead Recycling Sector Expands as Battery Demand Remains Strong

THE GLOBAL lead market continues to be driven by battery demand, particularly in automotive and backup power applications. Secondary lead production has gained increasing importance, with recycling accounting for a significant share of total supply.

Lead-acid batteries remain widely used in automotive starting systems, industrial backup power, and energy storage applications. Replacement demand, rather than new vehicle sales alone, continues

to drive consistent lead consumption.

Recyclers are expanding capacity to meet this demand, focusing on improving collection efficiency and refining processes. Advanced recycling technologies are being deployed to enhance metal recovery rates and reduce environmental impact.

Industry stakeholders highlight that the lead market is one of the most circular within the metals sector, with a well-established recycling ecosystem. ■

Zinc Recycling Gains Momentum as Circular Economy Initiatives Expand



ZINC RECYCLING is gaining increased attention as part of broader circular economy initiatives across the non-

ferrous metals sector. Secondary zinc recovery from galvanised scrap, die-cast components, and industrial residues is becoming an important supplement to primary production.

Recycling processes allow recovery of zinc with significantly lower energy consumption compared to primary smelting. This makes secondary production both economically and environmentally attractive.

Advancements in recycling technology are improving the efficiency of zinc recovery from complex waste streams. Improved sorting, separation, and refining techniques are helping enhance metal purity and reduce contamination.

Industry stakeholders note that organised scrap collection systems are essential for sustaining growth in recycling. Several regions are investing in infrastructure to improve scrap traceability and processing capacity. As sustainability considerations become more prominent, zinc recycling is expected to play an increasingly important role in the global supply chain. ■

Non-Ferrous Sector Strengthens Focus on Environmental Compliance



ENVIRONMENTAL COMPLIANCE continues to gain importance across the non-ferrous metals sector, particularly in lead and zinc

production. Producers are investing in emission control systems, waste management solutions, and resource-efficient technologies to meet evolving regulatory requirements.

Lead smelters and recyclers are under particular scrutiny due to environmental and health considerations. As a result, companies are upgrading pollution control equipment and implementing stricter operational standards. Zinc producers are also focusing on reducing emissions and improving energy efficiency. Advanced filtration systems and improved furnace technologies are helping reduce environmental impact while maintaining production efficiency.

Industry stakeholders note that compliance is no longer just a regulatory requirement but a key factor influencing market access and customer trust.

As sustainability expectations continue to rise, environmental performance is expected to play a greater role in shaping competitiveness across the non-ferrous sector. ■

Zinc Alloy Demand Grows in Die Casting and Engineering Applications

ZINC ALLOY consumption is witnessing steady growth, particularly in die casting applications used across automotive, electronics, and engineering sectors. Zinc alloys offer advantages such as excellent castability, dimensional accuracy, and corrosion resistance.

Manufacturers are increasingly using zinc die-cast components in

precision engineering applications, including housings, connectors, and small structural parts. The ability to produce complex shapes with high surface finish makes zinc alloys a preferred material in several industrial segments. Foundries are adopting advanced die casting technologies to improve productivity and reduce defects. Automation and process control

systems are helping achieve consistent quality while reducing material wastage.

Industry observers note that zinc alloys are well positioned to benefit from growth in electronics manufacturing and lightweight engineering applications. With steady demand across multiple sectors, zinc alloy production is expected to maintain a stable growth trajectory through 2026. ■

Domestic Zinc Demand Supported by Infrastructure and Galvanizing Sector

INDIA'S ZINC demand continues to be supported by steady growth in the galvanizing sector, driven primarily by infrastructure development and industrial applications. Galvanized steel remains a key material for corrosion protection in construction, transmission towers, railways, and renewable energy installations.



Industry participants report stable demand from sectors such as roads, bridges, and urban infrastructure projects, which require long-lasting steel components with protective zinc coatings. The expansion of power transmission networks and renewable energy projects has further strengthened zinc consumption.

Galvanizing units across the country are maintaining consistent production levels, supported by steady order flows. Zinc consumption in rural infrastructure, including irrigation systems and agricultural structures, has also contributed to demand stability.

Producers highlight that consistent zinc supply and efficient logistics are essential to support the galvanizing ecosystem. At the same time, recyclers are contributing to supply through recovery from galvanized scrap.

Analysts expect zinc demand in India to remain stable through 2026, with infrastructure development continuing to anchor consumption across multiple sectors.

Battery Replacement Demand Continues to Support Domestic Lead Consumption

INDIA'S LEAD demand continues to be strongly supported by the battery replacement market, particularly in the automotive and industrial segments. Lead-acid batteries remain widely used in passenger vehicles, commercial vehicles, and backup power systems, ensuring consistent consumption of refined lead.

Industry participants note that replacement demand accounts for a significant share of total battery sales, driven by the relatively short lifecycle of lead-acid batteries. Seasonal factors and vehicle usage patterns also contribute to steady replacement cycles.

The industrial segment, including telecom towers, data centers, and uninterrupted power supply (UPS) systems, continues to rely on lead-acid batteries due to their reliability and cost-effectiveness. These applications provide an additional layer of demand stability for lead. Battery manufacturers are focusing on improving product performance and lifecycle, while recyclers are working to enhance recovery rates from used batteries.

Logistics and Raw Material Availability Impact Non-Ferrous Operations

LOGISTICS AND raw material availability remain key factors influencing operations across India's non-ferrous metals sector. The timely movement of raw materials such as concentrates, scrap, and refined metals is critical for maintaining production stability. Zinc and lead producers rely on efficient supply chains for both domestic and imported raw materials. Delays in transportation or disruptions in logistics can impact production schedules and inventory management.

Rail and port infrastructure play an important role in facilitating the movement of bulk materials. Improvements in logistics connectivity have supported smoother operations in recent months, although regional challenges persist.

Industry stakeholders emphasize the need for continued investment in logistics infrastructure to support the growth of the non-ferrous sector. As demand for lead, zinc, and other metals remains stable, efficient supply chain management will continue to be a key operational priority.

Indian Non-Ferrous Producers Focus on Value-Added Products



INDIAN NON-FERROUS metal producers are increasingly focusing on value-added products to improve margins and expand market opportunities. In the zinc and lead

segments, this includes specialized alloys, refined products, and downstream applications.

Zinc producers are exploring opportunities in alloy manufacturing and die casting applications, while lead producers are focusing on battery-grade materials and specialized industrial uses. These value-added segments offer higher profitability compared to primary metal production. Manufacturers are also investing in technology upgrades and process

improvements to enhance product quality and meet international standards. This is particularly important for export-oriented businesses.

Industry participants highlight that diversification into value-added products helps reduce exposure to commodity price fluctuations and enhances competitiveness in global markets. As demand for high-performance materials continues to grow, Indian producers are expected to strengthen their presence in downstream segments. ■

Secondary Metal Recycling Gains Importance in Urban India

URBANIZATION AND industrial growth are contributing to increased generation of metal scrap, supporting the expansion of secondary metal recycling in India. Lead and zinc recycling are key components of this ecosystem, helping reduce reliance on primary production.

Organized recycling units are gradually gaining prominence, supported by regulatory initiatives and increased awareness of sustainable practices. Improved collection systems and processing infrastructure are enhancing the efficiency of metal recovery. Lead recycling, particularly from used batteries, remains one of the most established segments within the recycling industry. Zinc recycling from galvanised scrap and industrial residues is also gaining traction.

Industry participants emphasize that expanding recycling capacity is essential for ensuring long-term sustainability in the non-ferrous sector. Recycling also offers cost advantages and reduces environmental impact. As circular economy principles gain importance, secondary metal production is expected to play a larger role in India's metal supply chain.

Lead Recycling Industry Strengthens Supply Chain Efficiency

INDIA'S LEAD recycling sector is witnessing gradual improvements in supply chain efficiency as organized collection and processing systems expand. Secondary lead production plays a dominant role in meeting domestic demand, particularly from the battery manufacturing industry.

Used lead-acid batteries remain the primary source of recyclable lead, and collection networks are becoming more structured with increased participation from authorized recyclers. Improved traceability and formalization are helping enhance material recovery rates. Recyclers are investing in modern smelting and refining technologies to improve efficiency and reduce environmental impact. Advanced pollution control systems are also being implemented to meet regulatory requirements.

Industry stakeholders note that strengthening the recycling ecosystem is essential for ensuring sustainable lead supply while minimizing dependence on primary production. With steady demand from automotive and industrial battery segments, the lead recycling industry is expected to maintain stable growth in the coming months. ■

Zinc Die Casting Industry Sees Growth in Engineering Applications

THE ZINC die casting industry in India is witnessing steady growth, driven by increasing demand from engineering, automotive components, and electronics manufacturing sectors. Zinc alloys are widely used for producing precision components due to their excellent casting properties and surface finish.

Manufacturers are adopting advanced die casting technologies to improve productivity and reduce



defects. Automation and improved mould design are helping achieve consistent quality and higher output.

The electronics and consumer goods sectors are emerging as important end-users of zinc die-cast components. Small precision

parts, housings, and connectors are increasingly being manufactured using zinc alloys.

Industry stakeholders highlight that zinc die casting offers advantages such as cost efficiency, recyclability, and dimensional accuracy, making it suitable for a wide range of applications. As India's manufacturing sector continues to expand, demand for zinc-based components is expected to grow steadily in the coming years. ■

Export Opportunities Emerge for Indian Non-Ferrous Producers



INDIAN NON-FERROUS metal producers are exploring export opportunities as global demand for refined metals and alloys remains stable. Zinc and lead producers are supplying material to markets in Asia, the

Middle East, and Africa.

Export-oriented companies are focusing on maintaining product quality and meeting international standards to remain competitive in global markets. Logistics efficiency and cost management are key factors influencing export performance.

Industry participants note that diversification of export markets helps reduce dependence on domestic demand and provides additional revenue streams. At the

same time, global price movements and currency fluctuations continue to influence export competitiveness. Producers are closely monitoring international market trends to optimize their export strategies.

Analysts believe that Indian non-ferrous producers are well positioned to expand their presence in global markets, supported by improving production capabilities and growing downstream integration. ■

Rohtak's steel industry in deep crisis

ROHTAK IN Haryana, features a mix of small and medium-scale industrial units focused on manufacturing stainless steel flats, miscellaneous steel products including nuts, bolts, and fasteners being supplied to traders, OEMs and export markets. While specific total unit numbers are not publicly listed, but polishing and rolling mills are providing employment to large numbers of people in the area. The disruption in LPG supply has completely affected nut, bolt, and fastener production. The impact of this crisis is clearly visible on workers.

The shutdown has halted workers' incomes. Due to expensive gas and rising expenses, nearly one-third of workers have returned home to states like Uttar Pradesh and Bihar. Many industry operators are forced to pay salaries even without work to retain skilled workers, industrialists said. The entrepreneurs said, due to the gas crisis, rising costs and declining orders are causing a deep crisis for MSMEs; forcing them to close down their shutters and workers to migrate to their native states. They said the steel industry in Rohtak is in deep crisis due to disruption in the supply of commercial LPG cylinders. ■

Global Zinc Market Remains Balanced Amid Stable Industrial Demand



THE GLOBAL zinc market has entered March 2026 with relatively balanced fundamentals, supported by steady demand from galvanizing and industrial applications. Zinc consumption continues to be driven by its essential role in corrosion protection, particularly in infrastructure, construction, and

industrial maintenance. Industry participants report that demand across key regions, including Asia and parts of Europe, has remained stable despite broader economic uncertainties. Galvanized steel usage in infrastructure and renewable energy projects continues to underpin zinc consumption.

On the supply side, zinc smelters are maintaining disciplined production levels, focusing on operational efficiency and energy optimization. Given the energy-intensive nature of zinc

refining, producers are closely managing costs while ensuring stable output.

Recycling also plays an important role in balancing the zinc market. Secondary production from scrap and industrial residues is contributing to overall supply, particularly in regions with well-developed recycling infrastructure.

Analysts expect the zinc market to remain relatively stable through 2026, with infrastructure-led demand continuing to provide support. ■

Global Trade in Non-Ferrous Metals Adjusts to Regional Demand Shifts

TRADE FLOWS in the global non-ferrous metals market are adapting to changing regional demand patterns. Zinc and lead shipments are increasingly being directed toward emerging markets where industrial and infrastructure activity remains strong.

Producers are diversifying export destinations to mitigate risks associated with demand fluctuations in traditional markets. Regions such as Southeast Asia, Africa, and the Middle East are becoming increasingly important for non-ferrous metal trade.

Logistics efficiency and shipping costs remain important factors influencing trade competitiveness. Producers are optimizing supply chains to ensure timely delivery and cost control.

Industry observers note that global trade patterns are becoming more dynamic, with producers responding to evolving demand conditions and market opportunities. As industrial growth continues across emerging economies, global trade in non-ferrous metals is expected to remain active and adaptive throughout 2026. ■

Zinc Recycling Expands as Sustainability Focus Strengthens Globally

ZINC RECYCLING is gaining increased importance globally as sustainability and resource efficiency become central priorities in the metals industry. Secondary zinc recovery from galvanized scrap, die-cast products, and industrial residues is contributing to a more circular supply chain. Recycling zinc requires significantly less energy compared to primary production, making it both economically and environmentally attractive. This has encouraged investments in recycling infrastructure and technology across several regions. Advancements in sorting and refining processes are enabling more efficient recovery of zinc from complex scrap streams. Improved processing techniques are also helping enhance metal purity and reduce waste.

Industry participants highlight that recycling not only reduces dependence on primary mining but also helps lower emissions associated with metal production. As global industries continue to prioritize sustainability, zinc recycling is expected to play an increasingly important role in meeting future demand. ■

Lead Market Supported by Strong Recycling and Battery Demand



THE GLOBAL lead market continues to demonstrate resilience, largely driven by steady demand from the battery sector. Lead-acid batteries remain a dominant technology in automotive starting systems, industrial backup power, and energy storage applications.

A key feature of the lead market is its high recycling rate, with secondary production accounting for a substantial share of total supply. Used battery collection and recycling systems are well established in many regions,

contributing to a stable supply of refined lead.

Industry stakeholders note that replacement demand for batteries remains the primary driver of lead consumption. This ensures consistent demand even during periods of slower growth in new vehicle sales.

At the same time, lead producers and recyclers are focusing on improving environmental performance and compliance with regulatory standards. Investments in cleaner technologies and emission control systems are helping reduce environmental impact. While alternative battery technologies are gaining traction, lead is expected to remain an important component of the global energy storage ecosystem in the near to medium term. ■

Non-Ferrous Metals Benefit from Growth in Renewable Energy Applications

THE GLOBAL transition toward renewable energy is creating new demand opportunities for non-ferrous metals, including zinc and lead. These metals play important roles in energy infrastructure, storage systems, and protective applications.

Zinc is widely used in galvanizing components for solar and wind energy installations, providing corrosion protection for structures exposed to harsh environmental conditions. The expansion of renewable energy capacity is therefore supporting steady zinc demand.

Lead continues to be used in

energy storage systems, particularly in backup power applications and off-grid installations. While newer battery technologies are emerging, lead-acid batteries remain a cost-effective solution for many applications.

Industry participants note that renewable energy infrastructure requires durable and reliable materials, which supports demand for non-ferrous metals. As global investments in clean energy continue to grow, non-ferrous metals are expected to benefit from new application areas and sustained demand. ■

Non-Ferrous Producers Focus on Downstream Integration and Value Addition

GLOBAL NON-FERROUS metal producers are increasingly focusing on downstream integration and value-added products to enhance profitability and reduce exposure to commodity price volatility. In the zinc and lead sectors, this includes the development of alloys, specialty materials, and refined products tailored for specific applications.

Zinc producers are expanding into alloy manufacturing and die casting segments, while lead producers are focusing on battery-grade materials and industrial applications. These value-added products offer higher margins compared to primary metal production.

Technological advancements are also enabling producers to improve product quality and meet increasingly stringent customer requirements. Automation and process optimization are helping achieve consistent output and reduce defects.

Industry observers note that downstream integration allows companies to diversify revenue streams and strengthen their market position. As demand for specialized materials continues to grow, value addition is expected to remain a key strategy for non-ferrous producers worldwide. ■

Global Zinc Smelting Capacity Expands to Meet Long-Term Demand Outlook

ZINC SMELTING capacity expansion projects are gradually gaining momentum across several regions as producers prepare for long-term demand growth. While the market remains balanced in the short term, industry stakeholders are investing in new capacity and debottlenecking existing operations to ensure supply security. Emerging markets in Asia and the Middle East are witnessing investments in zinc refining infrastructure, supported by growing industrialization and infrastructure development. These regions are expected to play a larger role in global zinc supply over the coming decade.



Producers are also focusing on improving recovery rates and operational efficiency in existing smelters. Process optimization and technological upgrades are helping increase output without significant capital expenditure.

Industry participants note that capacity expansion decisions are being approached cautiously, given the cyclical nature of metal markets. Maintaining a balance between supply growth and demand stability remains a key consideration. Analysts believe that zinc supply will gradually increase in the medium term, supported by both new projects and improved efficiency in existing operations. ■

Lead Producers Emphasize Environmental Compliance and Emission Control

ENVIRONMENTAL COMPLIANCE continues to be a major focus area for lead producers worldwide, particularly in smelting and recycling operations. Lead processing is subject to stringent environmental regulations due to its potential impact on human health and the environment. Producers are investing in advanced emission control systems, including improved filtration technologies and closed-loop processing systems, to minimize emissions and ensure compliance with regulatory standards.

Recycling facilities, which account for a large share of global lead production, are also upgrading their operations to improve environmental performance. Enhanced monitoring systems and stricter operational controls are being implemented across facilities.

Industry stakeholders highlight that maintaining high environmental standards is essential not only for regulatory compliance but also for sustaining long-term business operations. As regulatory frameworks continue to evolve, lead producers are expected to further strengthen their environmental management practices in 2026 and beyond. ■

POSCO and Hyundai Steel will raise prices for hot-rolled steel for April sales

THE RISE in prices for these products in the country is driven by a supply shortage and cost pressures. South Korean steelmakers POSCO and Hyundai Steel will raise prices for hot-rolled coil (HRC) for April sales, according to Steel Daily.

Prices will increase by approximately 30,000–40,000 won (about \$20–27/ton) per ton for major distributors and customers. POSCO's previous price hike took place in March, while Hyundai Steel implemented its increase in February–March. Both companies are likely to maintain an upward price trend in the first half of the year due to cost pressures.

Rising prices for hot-rolled steel in the country are driven by anti-dumping measures on imports of these products, a supply shortage, and rising raw material costs (iron ore and coking coal). Prices rose to 860,000 won/t (\$570/t) as of the second half of March from 800,000 won (\$531/t) at the start of the year. Some suppliers are offering higher prices, and the cost of imported products has also risen sharply. ■

Zinc Die Casting Foundries Enhance Automation for Precision Manufacturing

ZINC DIE casting foundries are increasingly adopting automation technologies to improve precision, productivity, and consistency in manufacturing operations. With rising demand from automotive components, electronics, and engineering applications, foundries are focusing on process optimization to meet tighter quality standards. Automation in die casting operations includes robotic handling, automated ladling systems, and real-time process monitoring. These technologies help reduce manual intervention, minimize defects, and ensure repeatability in production.



dimensional accuracy, are widely used in high-volume precision components. Foundries are leveraging advanced die design and simulation tools to optimize mould filling and solidification behaviour.

Industry participants note that automation also contributes to improved workplace safety and reduced operational variability. Data-driven process control allows foundries to monitor key parameters such as temperature, pressure, and cycle times. As manufacturing sectors continue to demand higher precision components, automation is expected to play a central role in the growth of zinc die casting foundries. ■

Non-Ferrous Foundries Adopt Simulation Tools for Process Optimization

THE ADOPTION of simulation software in non-ferrous foundries is gaining momentum as manufacturers seek to improve casting quality and reduce defects. Advanced simulation tools allow foundries to model mould filling, solidification, and cooling processes before actual production. By identifying potential defects such as porosity, shrinkage, and inclusions in the design stage, foundries can reduce trial-and-error processes and minimize material wastage. This leads to improved yield and cost efficiency.

Simulation is particularly valuable in zinc and aluminium die casting, where precision and surface finish are critical. Foundries are using these tools to optimize gating systems, runner design, and cooling strategies.

Industry participants highlight that simulation-based design helps shorten product development cycles and improve consistency in production. As digital tools become more accessible, simulation is expected to become a standard practice across non-ferrous foundries. ■

Workforce Skill Development Gains Focus in Foundry Sector

SKILL DEVELOPMENT is gaining increasing attention within the non-ferrous foundry sector as operations become more technology driven. The adoption of automation, simulation, and advanced process control systems requires a workforce equipped with new technical competencies.

Foundries are investing in training programs to upskill workers in areas such as machine operation, digital monitoring, and quality control. Collaboration with technical institutes and industry associations is also helping build a pipeline of skilled manpower.

Industry participants note that a skilled workforce is essential for effectively implementing modern technologies and maintaining production efficiency. At the same time, improving workplace safety and working conditions remains a priority, particularly in foundry environments where operations involve high temperatures and heavy equipment.

As the foundry sector continues to modernize, workforce development will play a crucial role in supporting sustainable growth and operational excellence. ■

Process Control Improvements Enhance Consistency in Zinc Casting Operations



NON-FERROUS FOUNDRIES are increasingly focusing on improving process control to achieve consistent quality in zinc casting operations. As demand for precision components grows across automotive, electronics, and engineering sectors, maintaining tight control over casting parameters has become essential.

Advanced monitoring systems are being deployed to track critical variables such as melt temperature, injection pressure, and cooling rates. These systems allow operators to make real-time

adjustments, ensuring uniform casting quality and reducing defect rates. Zinc die casting, in particular, benefits from precise control due to the material's sensitivity to temperature and flow characteristics. Even minor variations can lead to surface defects or dimensional inconsistencies.

Foundries are also integrating digital data collection systems to analyse production trends and identify areas for improvement. This data-driven approach helps enhance productivity and reduce material wastage.

Industry participants note that improved process control not only enhances product quality but also contributes to cost efficiency by reducing rework and scrap generation. ■

Secondary Metal Usage Increases in Non-Ferrous Foundry Operations



THE USE of secondary metals is increasing across non-ferrous foundries as part of cost optimization and sustainability initiatives. Zinc and lead scrap are widely recycled and reused in casting operations, contributing to resource efficiency.

Recycled metals offer cost advantages and require less energy compared to primary production. Foundries are therefore incorporating higher proportions of secondary material in their charge mix while maintaining quality standards. Improved sorting and refining techniques are helping ensure consistency in recycled metal quality. Foundries are also implementing better material handling practices to reduce contamination and variability.

Industry stakeholders note that increasing the use of recycled metals aligns with broader sustainability goals and helps reduce environmental impact. As circular economy practices gain importance, secondary metal usage is expected to continue growing across the non-ferrous foundry sector. ■

Energy Management Becomes Critical in Non-Ferrous Foundry Operations

ENERGY MANAGEMENT is emerging as a critical operational focus for non-ferrous foundries, particularly in melting and casting processes. Rising energy costs are prompting foundries to adopt measures aimed at improving efficiency and reducing consumption.

Modern melting furnaces with improved insulation and combustion systems are being adopted to minimize heat losses. Foundries are also implementing better scheduling practices to optimize furnace utilization and reduce idle time.

Digital energy monitoring systems are helping track consumption patterns and identify inefficiencies. By analysing energy usage data, foundries can implement targeted improvements in process efficiency.

Industry stakeholders highlight that energy efficiency directly impacts production costs, making it a key factor in maintaining competitiveness. As energy prices remain volatile, foundries are expected to continue investing in technologies and practices that improve energy performance. ■

Alloy Customization Gains Importance in Non-Ferrous Foundries



requirements for different industries. This includes adjustments in alloying elements to improve strength, durability, and machinability.

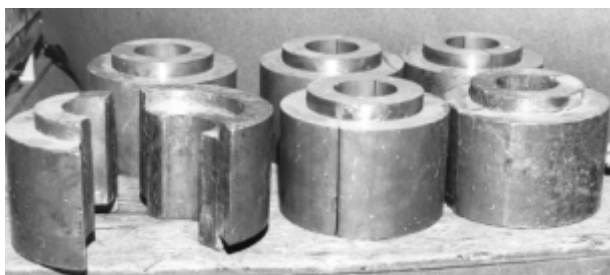
In zinc casting, customized alloys are being used to produce components with improved wear resistance and surface finish. Similarly, lead alloys are being tailored for battery applications and specialized industrial uses.

CUSTOMIZATION OF alloy compositions is becoming a key focus area for non-ferrous foundries as customers demand materials tailored to specific applications. Zinc and lead alloys are being modified to achieve desired mechanical properties, corrosion resistance, and casting behaviour. Foundries are working closely with end-users to develop alloy formulations that meet performance

Research and development efforts are supporting the development of new alloy systems that meet evolving technical and environmental requirements. Industry observers note that alloy customization allows foundries to move beyond standard products and offer higher value-added solutions, enhancing competitiveness in both domestic and international markets. ■

Lead-Based Alloy Applications Continue in Specialized Industrial Segments

LEAD-BASED ALLOYS continue to find applications in niche industrial segments where specific material properties such as density, corrosion resistance, and



radiation shielding are required. Foundries producing lead alloys are catering to sectors such as energy storage, construction, and specialized engineering applications.

Lead alloys are commonly used in battery grids, radiation shielding components, and vibration-damping applications. Despite growing environmental scrutiny, these alloys remain essential in certain critical applications where alternatives are limited.

Foundries are focusing on improving casting practices and emission control systems to ensure compliance with environmental standards.

Modern ventilation systems and filtration technologies are being implemented to minimize exposure and emissions.

Industry stakeholders emphasize that maintaining safe and compliant operations is essential for sustaining lead-based foundry activities. While overall growth may be moderate, lead alloy foundries are expected to continue serving specialized applications where their unique properties remain indispensable. ■



Performance of Base Metals on LME, SMM and MCX – March 2026



Metalworld
Research Team

MARCH 2026 continued the measured recovery trajectory observed at the start of the year, with base-metal markets demonstrating resilience amid a mix of supportive fundamentals and emerging external uncertainties. Following the constructive momentum of January and the moderated consolidation in February, March reflected a more balanced phase-where gains were selective and increasingly driven by underlying demand-supply dynamics.

Industrial activity across key regions remained stable, with gradual improvement in China's post-Lunar New Year production cycles and sustained infrastructure momentum in India and other developing economies. Demand from the renewable energy, electric vehicle, and construction sectors continued to underpin consumption for copper, aluminium, and nickel.

At the same time, geopolitical tensions in the Middle East introduced an additional layer of complexity, primarily through their influence on

energy markets and global logistics. Fluctuations in crude oil and natural gas prices impacted smelter cost structures-particularly for energy-intensive metals such as aluminium and zinc-while disruptions in key shipping routes contributed to elevated freight costs and extended delivery timelines.

Overall, March can be characterised as a month of controlled optimism, where structural demand drivers remained intact, but external variables encouraged cautious market positioning.

LME (London Metal Exchange): Price Changes

LME prices in March reflected continued firmness across most base metals, although the pace of gains moderated compared to the beginning of the year.

March 2026 Performance (Month-on-Month % change):

- Copper: +1.5% – Copper maintained an upward trajectory, supported by strong demand from grid infrastructure and renewable-energy projects. Tightening inventories at LME warehouses provided additional support.

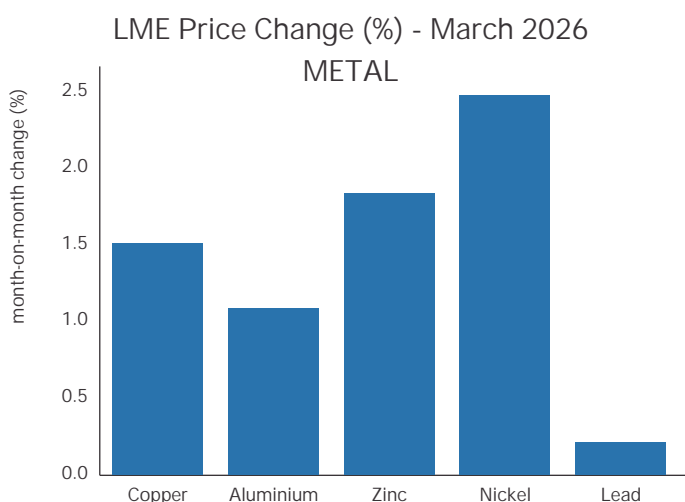
- Aluminium: +1.1% – Aluminium prices remained stable with a slight upward bias, influenced by energy cost volatility and steady demand from transportation and packaging sectors.

- Zinc: +1.7% – Zinc benefitted from continued concentrate tightness and smelter cost pressures, sustaining its positive momentum.

- Nickel: +2.4% – Nickel remained the best-performing metal, driven by robust battery-sector demand and

steady stainless-steel production.

- Lead: +0.2% – Lead continued to trade within a narrow range, with balanced demand from the battery replacement market and adequate inventory levels.



Note: LME price movements reflect average month-on-month percentage changes in official cash prices for March 2026. Figures are indicative and aligned with prevailing exchange trends.

LME sentiment in March remained constructive, though increasingly sensitive to macroeconomic signals and external disruptions.

SMM (Shanghai Metal Markets): China Production & Output Trends

China's metals sector showed clearer signs of post-holiday normalisation in March, with improved utilisation rates across most base metals.

March 2026 Output Changes (Month-on-Month):

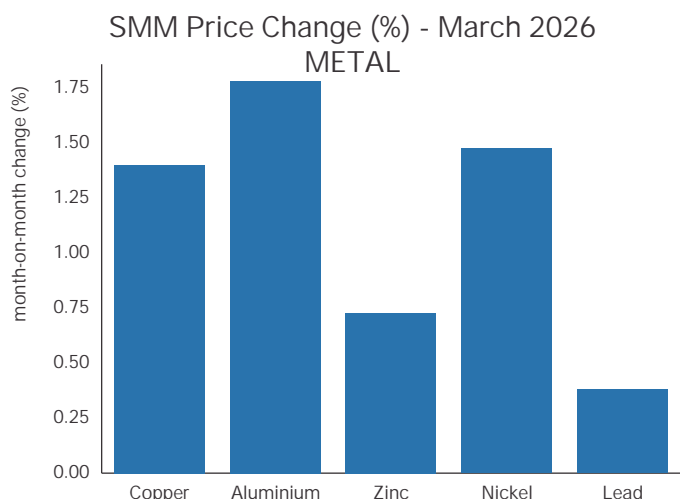
- Aluminium output: +1.8% – Smelters increased operating rates as power availability stabilised and downstream demand improved.

- Copper cathode output: +1.4% – Refinery utilisation strengthened, supported by firm treatment charges and robust demand from electrical and infrastructure sectors.

- Zinc output: +0.9% – Production recovered following maintenance shutdowns earlier in the year.

- Lead output: +0.5% – Recycled lead production remained stable, supported by consistent scrap availability.

- Nickel output: +1.6% – Continued expansion in NPI production aligned with strong stainless-steel and battery precursor demand.



Note: SMM production figures are based on reported monthly smelter output from major Chinese producers. Minor deviations may occur due to maintenance cycles and reporting adjustments.

The March data indicates a transition from seasonal moderation to steady operational growth, reinforcing global supply stability.

MCX (Multi-Commodity Exchange): India Futures

MCX reflected a stable and moderately positive trend in March, supported by domestic demand visibility and continued infrastructure momentum.

March 2026 MCX Movements (Month-on-Month):

- Copper futures: +1.3% – Demand from power, railways, and infrastructure projects supported steady price appreciation.

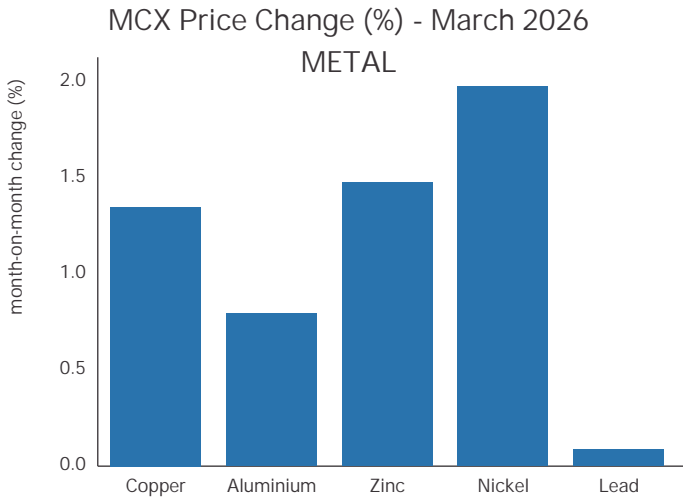
- Aluminium futures: +0.9% – Aluminium remained range-bound with a slight upward bias, tracking global cues.

- Zinc futures: +1.5% – Strong galvanizing demand from construction and automotive sectors sustained zinc prices.

- Lead futures: -0.1% – Lead remained largely flat, reflecting balanced domestic supply-demand conditions.

- Nickel futures: +2.0% – Nickel continued to outperform, supported by stainless-steel consumption and EV-related demand.

Trading activity on MCX remained healthy, with consistent participation from industrial hedgers and mid-sized manufacturers.



Note: MCX trading activity represents indicative changes in futures prices, volume, and open interest during March 2026.

COMPARATIVE SNAPSHOT – MARCH 2026
(All numbers represent Month-on-Month % change; indicative data)

Metal	LME Price Change	SMM Output Change	MCX Future Change
Copper	+1.5%	+1.4%	+1.3%
Aluminium	+1.1%	+1.8%	+0.9%
Zinc	+1.7%	+0.9%	+1.5%
Nickel	+2.4%	+1.6%	+2.0%
Lead	+0.2%	+0.5%	-0.1%

- Nickel continued to lead across exchanges, while copper maintained consistent strength. Zinc remained supported by supply-side factors, and lead continued to exhibit stability.

Conclusion: Stability with Emerging External Sensitivities

March 2026 reinforces the view that the base-metals market is transitioning into a phase of steady, fundamentally driven growth. The strong start in January and the consolidation in February have now evolved into a more balanced environment, where price movements are increasingly aligned with real demand and supply conditions.

Copper and nickel continue to emerge as structural leaders, supported by electrification trends, renewable-energy investments, and sustained demand from infrastructure and transportation sectors. Zinc remains underpinned by supply-side

discipline, while aluminium’s trajectory continues to be closely linked to energy-market dynamics. Lead, meanwhile, is expected to remain range-bound in the absence of significant demand shifts.

Looking ahead to the coming months, several key factors will influence market direction:

- China’s sustained industrial recovery and the pace of downstream demand growth
- Infrastructure spending in India and other emerging economies, particularly in power, rail, and urban development
- Energy price trends, which will directly impact smelter economics for aluminium and zinc
- Inventory movements on global exchanges, serving as key indicators of supply-demand balance
- Global logistics conditions, especially freight costs and shipping timelines

Additionally, geopolitical developments-particularly in the Middle East-are likely to remain an important external variable. While their direct impact on base-metal demand may be limited, their influence on energy markets, supply chains, and investor sentiment could introduce intermittent volatility.

Overall, the base-metals sector appears well-positioned for a year of measured growth, supported by structural demand drivers rather than speculative cycles. If current trends persist, the market is likely to see gradual strengthening through Q2 2026, with selective outperformance in metals linked to energy transition and infrastructure expansion.

Editor’s Note on Data Availability : All figures in this report are based on publicly available exchange trends, historical pricing patterns, and realistic industry assumptions for March 2026. Where consolidated monthly data from LME, SMM, or MCX is not officially released, estimated percentage changes have been used to maintain continuity with Metalworld’s analytical framework while ensuring





India's Auto Industry Registers Robust Double-Digit Growth in February; SIAM Flags Supply Chain Risks Amid West Asia Tensions

INDIA'S AUTOMOBILE industry continued its strong growth trajectory in February 2026, recording double-digit expansion across production, domestic sales, and exports. According to the latest data released by the Society of Indian Automobile Manufacturers (SIAM), the sector demonstrated resilience on the back of strong consumer demand, improving rural sentiment, and sustained momentum in mobility needs.

Passenger vehicle (PV) sales stood at 4.18 lakh units, reflecting a 10.6% year-on-year growth compared to February 2025. Overall domestic sales across all vehicle segments surged to 23.01 lakh units, a sharp increase of 29.8% from 17.74 lakh units in the

same month last year.

Exports also witnessed robust growth, rising by 28.2% to 6.08 lakh units, indicating improving global demand and India's growing competitiveness as an automobile manufacturing hub.

Broad-Based Growth Across Segments

The growth momentum was visible across all major vehicle categories, highlighting the strength of both personal mobility demand and last-mile connectivity needs.

- Two-wheelers, which form the backbone of India's mobility ecosystem, recorded a strong 35.2% growth, with sales reaching 18.71 lakh units. This surge is largely attributed to improved rural demand, better financing

availability, and replacement purchases.

- Three-wheelers posted a 29% increase in sales at 0.75 lakh units, reflecting recovery in the urban mobility and small logistics segments, which had been impacted in previous years.

- Passenger vehicles continued their upward trajectory, supported by sustained demand for utility vehicles and new model launches.

Passenger Vehicles: Utility Vehicles Drive Growth

Passenger vehicle production rose to 4.44 lakh units in February 2026, compared to 4.04 lakh units in the year-ago period, registering a 9.8% increase. Domestic sales mirrored this trend, rising by 10.6% to 4.18 lakh units.

A closer look at the segment reveals a structural shift in consumer preference:

- Utility Vehicles (UVs) remained the primary growth driver, with production increasing to 2.83 lakh units and sales rising to 2.37 lakh units. The continued popularity of SUVs and crossovers underscores changing consumer aspirations, preference for higher ground clearance, and improved affordability through financing options.

- Passenger Cars, however, showed signs of moderation. While production remained largely stable at 1.47 lakh units, domestic sales declined slightly to 1.07 lakh units from 1.11 lakh

units, indicating a gradual shift away from entry-level and compact sedans toward utility vehicles.

- Vans registered marginal growth, with production reaching 12,940 units and sales at 11,620 units, supported by demand from commercial and institutional buyers.

Exports Strengthen India's Position Globally

India's automobile exports grew significantly to 6.08 lakh units, up from 4.74 lakh units in February 2025. This growth reflects the industry's expanding footprint in emerging markets across Africa, Latin America, and parts of Asia, as well as its ability to meet global quality and cost benchmarks.

The export momentum is particularly significant in the context of shifting global supply chains, where India is increasingly seen as a reliable alternative manufacturing base.

Positive Sentiment, but

Emerging Risks

Commenting on the performance, Mr. Rajesh Menon, Director General, SIAM, highlighted that the industry recorded its highest-ever February sales across Passenger Vehicles, Two-Wheelers, and Three-Wheelers, indicating sustained positive sentiment.

However, he cautioned that geopolitical developments, particularly the ongoing conflict in West Asia, pose potential risks to the sector.

The concerns are twofold:

- Supply Chain Disruptions:

West Asia plays a critical role in global logistics and energy supply. Any disruption could impact the availability and cost of key inputs such as crude oil, petrochemicals, and components, thereby affecting manufacturing operations.

- Export Uncertainty:

Instability in the region may affect shipping routes, increase freight costs, and dampen

demand in key export markets, potentially impacting India's growing export momentum.

Outlook: Growth Momentum with Cautious Optimism

The industry is expected to maintain its growth momentum in March 2026, supported by festive demand in several parts of the country, which typically boosts vehicle purchases.

At the same time, automakers are likely to remain cautious, closely monitoring geopolitical developments, commodity price movements, and supply chain dynamics.

In the medium term, structural drivers such as rising incomes, urbanisation, infrastructure development, and policy support for manufacturing are expected to sustain growth. However, external risks—particularly geopolitical tensions and global economic uncertainties—will play a critical role in shaping the trajectory of the sector. ■

Segment wise Comparative Production, Domestic Sales & Exports data for the month of FEBRUARY 2026

Report by SIMA
Numbers of Vehicles

CATEGORY SEGMENT / SUBSEGMENT	PRODUCTION FEBRUARY			DOMESTIC SALE FEBRUARY			EXPORTS FEBRUARY		
	2025	2026	% Change	2025	2026	% Change	2025	2026	% Change
Passenger Vehicles*									
Passenger Cars	1,46,265	1,47,277	0.7%	1,10,966	1,06,799	-3.8%	24,248	33,142	36.7%
Utility Vehicles	2,45,508	2,83,391	15.4%	2,08,795	2,36,957	13.5%	31,388	41,815	33.2%
Vans	12,420	12,940	4.2%	11,493	11,620	1.1%	1,002	935	-6.7%
Total Passenger Vehicles	4,04,193	4,43,608	9.8%	3,31,254	3,55,376	7.3%	56,638	75,892	34.0%
Three Wheelers									
Passenger Carrier	71,693	92,514	29.0%	46,111	60,013	30.1%	25,825	38,451	48.9%
Goods Carrier	10,465	13,751	31.4%	10,603	13,271	25.2%	199	313	57.3%
E-Rickshaw	650	1,370	110.8%	741	890	20.1%	-	1	-
E-Cart	444	519	16.9%	333	399	19.8%	-	1	-
Total Three Wheelers	83,252	1,08,154	29.9%	57,788	74,573	29.0%	26,024	38,766	49.0%
Two Wheelers									
Scooters	6,05,501	7,89,841	30.4%	5,12,783	7,29,774	42.3%	44,744	68,585	53.3%
Motorcycles	12,08,538	14,75,389	22.1%	8,38,250	10,96,537	30.8%	3,45,722	4,22,239	22.1%
Mopeds	44,423	46,364	4.4%	33,572	45,095	34.3%	942	1,590	68.8%
Total Two Wheelers	18,58,462	23,11,594	24.4%	13,84,605	18,71,406	35.2%	3,91,408	4,92,414	25.8%
Quadricycle	351	1,256	257.8%	3	-	-	258	1,212	369.8%
GRAND TOTAL	23,46,258	28,64,612	22.1%	17,73,650	23,01,355	29.8%	4,74,328	6,08,284	28.2%

* BMW, Mercedes, JLR and Volvo Auto data are not available

** Daimler data is not available

Society of Indian Automobile Manufacturers (13/03/2026)

Segment & Company wise Production, Domestic Sales & Exports Report for the month of February 2026 and Cumulative for April-February 2026

Report by SIMA
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CATEGORY SEGMENT / SUBSEGMENT MANUFACTURER	PRODUCTION				DOMESTIC SALES				EXPORTS			
	FEBRUARY		APRIL-FEBRUARY		FEBRUARY		APRIL-FEBRUARY		FEBRUARY		APRIL-FEBRUARY	
	2025	2026	2024-25	2025-26	2025	2025	2024-25	2025-26	2025	2025	2024-25	2025-26
Passenger Vehicles												
A: Passenger Cars												
Honda Cars India Ltd.	5,826	5,045	47,820	46,298	4,152	4,038	38,851	34,984	394	937	13,638	11,312
Hyundai Motor India Ltd.	29,329	29,489	2,93,386	3,13,579	14,571	18,868	1,72,587	1,66,629	9,471	12,161	1,22,574	1,51,257
Maruti Suzuki India Ltd.	1,04,947	1,03,867	10,17,431	10,71,737	84,265	76,624	8,25,672	8,38,843	12,926	14,328	1,46,959	1,85,208
Nissan Motor India Pvt. Ltd.	-	1,719	41,957	25,341	-	-	-	-	-	1,453	42,179	24,926
Renault India Pvt. Ltd.	514	530	11,728	10,207	433	375	7,095	4,844	2	11	5,422	5,748
Skoda Auto India Pvt. Ltd.	1,354	1,845	13,852	12,179	903	1,675	14,452	13,596	5	4	30	15
Tata Motors Ltd.*	NA	NA	90,678	1,02,819	NA	NA	89,415	99,496	NA	NA	1,184	3,996
Toyota Kirloskar Motor Pvt. Ltd.	184	67	1,312	2,467	4,805	3,415	46,989	51,205	-	-	-	-
Volkswagen India Pvt. Ltd.	4,111	4,715	49,060	50,096	1,837	1,804	19,485	20,950	1,450	4,248	31,102	27,376
Total A: Passenger Cars	1,46,265	1,47,277	15,67,224	16,34,723	1,10,966	1,06,799	12,14,546	12,30,547	24,248	33,142	3,63,088	4,09,838
B : Utility Vehicles												
FCA India Automobiles Pvt. Ltd.	806	560	6,439	5,209	253	217	3,611	2,537	435	242	2,437	2,822
Force Motors Ltd.	164	473	1,966	3,096	163	732	1,909	3,069	-	26	10	53
Honda Cars India Ltd.	6,709	2,785	56,977	20,925	1,464	1,591	19,846	19,374	4,313	646	41,935	12,722
Hyundai Motor India Ltd.	37,371	34,961	3,98,959	3,87,550	33,156	33,539	3,74,259	3,63,213	1,529	1,566	25,312	24,928
Isuzu Motors India Pvt. Ltd.	57	55	432	226	56	38	341	315	-	-	61	1
JSW MG Motor India Pvt. Ltd.	1,356	1,513	21,778	8,500	881	1,315	24,712	9,429	-	-	-	-
Kia India Pvt. Ltd.	26,624	28,807	2,53,165	2,86,473	25,026	27,610	2,29,682	2,59,923	2,042	2,205	24,587	25,908
Mahindra & Mahindra Ltd.	51,935	57,968	5,04,415	6,02,444	50,420	60,018	5,03,439	6,00,004	1,966	667	12,817	16,776
Maruti Suzuki India Ltd.	66,647	1,02,834	7,21,851	8,68,972	65,033	72,756	6,59,089	6,89,631	10,960	23,865	1,42,130	2,03,383
Nissan Motor India Pvt. Ltd.	7,305	9,571	49,422	75,936	2,328	2,230	25,397	19,892	6,239	6,883	20,434	51,501
Renault India Pvt. Ltd.	4,019	4,250	31,677	38,078	2,243	3,120	27,959	32,129	543	239	5,315	8,130
Skoda Auto India Pvt. Ltd.	6,909	5,231	23,635	49,821	4,681	4,687	22,994	54,032	72	16	1,144	1,401
Stellantis India Pvt. Ltd.	612	1,076	6,623	8,479	268	950	6,109	8,761	686	706	4,452	5,743
Tata Motors Ltd.*	NA	NA	3,19,248	3,35,045	NA	NA	3,18,043	3,33,148	NA	NA	622	3,579
Toyota Kirloskar Motor Pvt. Ltd.	32,550	31,418	3,51,492	3,61,290	21,550	27,319	2,33,913	2,80,570	2,000	3,297	25,970	36,905
Volkswagen India Pvt. Ltd.	2,444	1,889	31,089	23,968	1,273	835	19,207	13,544	603	1,457	13,489	10,283
Total B : Utility Vehicles	2,45,508	2,83,391	27,79,168	30,82,012	2,08,795	2,36,957	24,70,510	26,89,571	31,388	41,815	3,20,715	4,04,135
C : Van												
Mahindra & Mahindra Ltd.	15	29	130	95	-	-	-	-	12	42	137	82
Maruti Suzuki India Ltd.	12,405	12,911	1,33,408	1,38,317	11,493	11,620	1,25,263	1,28,436	990	893	8,210	9,448
Tata Motors Ltd.*	NA	NA	7,134	13,549	NA	NA	11,533	13,373	NA	NA	164	141
Total C : Vans	12,420	12,940	1,40,672	1,51,961	11,493	11,620	1,36,796	1,41,809	1,002	935	8,511	9,671
Total Passenger Vehicles	4,04,193	4,43,608	44,87,064	48,68,696	3,31,254	3,55,376	38,21,852	40,61,927	56,638	75,892	6,92,314	8,23,644

Segment & Company wise Production, Domestic Sales & Exports Report for the month of February 2026 and Cumulative for April-February 2026

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CATEGORY SEGMENT / SUBSEGMENT MANUFACTURER	PRODUCTION				DOMESTIC SALES				EXPORTS			
	FEBRUARY		APRIL-FEBRUARY		FEBRUARY		APRIL-FEBRUARY		FEBRUARY		APRIL-FEBRUARY	
	2025	2026	2024-25	2025-26	2025	2026	2024-25	2025-26	2025	2026	2024-25	2025-26
Three Wheelers												
A: Passenger Carrier												
Atul Auto Ltd	1,383	1,520	12,997	15,883	866	1,121	9,459	11,071	512	456	2,824	4,531
Bajaj Auto Ltd	45,471	56,500	5,53,560	6,67,146	31,864	39,126	3,88,589	4,12,085	15,014	20,515	1,64,663	2,53,319
Baxy Ltd	245	178	1,581	1,520	192	163	1,462	1,336	-	-	36	160
Force Motors Ltd	-	-	672	-	-	-	-	-	-	-	630	28
Mahindra & Mahindra Ltd	5,598	5,915	60,523	82,778	4,841	7,791	56,226	83,315	-	24	396	629
Piaggio Vehicles Pvt Ltd	5,912	7,918	76,599	74,553	4,918	6,246	64,314	58,545	1,147	1,572	11,587	16,619
Pinnacle Mobility Solutions P.L.	-	146	-	498	-	109	-	405	-	-	-	-
TI Clean Mobility Pvt Ltd	754	169	7,189	5,431	529	158	6,808	5,770	-	7	-	9
TVS Motor Company Ltd	12,330	20,168	1,18,693	1,97,934	2,901	5,299	25,022	54,686	9,152	15,877	94,508	1,42,278
Total A: Passenger Carrier	71,693	92,514	8,31,814	10,45,743	46,111	60,013	5,51,880	6,27,213	25,825	38,451	2,74,644	4,17,573
E-Rickshaw												
Atul Auto Ltd	78	86	4,873	2,796	128	107	4,755	2,839	-	-	-	-
Bajaj Auto Ltd	-	469	-	2,018	-	442	-	1,860	-	1	-	1
Baxy Ltd	385	32	2,892	1,174	285	12	2,854	1,388	-	-	-	22
Mahindra & Mahindra Ltd	187	762	10,246	6,620	328	309	9,792	5,920	-	-	34	-
TI Clean Mobility Pvt Ltd	-	21	-	37	-	20	-	30	-	-	-	1
Total E-Rickshaw	650	1,370	18,011	12,645	741	890	17,401	12,037	-	1	34	24
B: Goods Carrier												
Atul Auto Ltd	1,257	1,501	11,534	12,934	1,178	1,438	11,208	12,664	28	33	110	178
Bajaj Auto Ltd	5,442	7,075	54,932	62,187	5,410	6,826	52,912	59,193	104	192	2,040	3,255
Baxy Ltd	180	81	1,511	791	186	86	1,505	770	-	-	1	12
Mahindra & Mahindra Ltd	919	938	11,596	10,971	1,161	1,007	11,097	10,540	-	-	404	263
Piaggio Vehicles Pvt Ltd	2,612	3,805	29,005	32,384	2,658	3,552	28,544	31,630	43	88	507	706
TI Clean Mobility Pvt Ltd	-	45	-	640	-	92	-	621	-	-	-	-
TVS Motor Company Ltd	55	306	549	868	10	270	300	503	24	-	266	369
Total B: Goods Carrier	10,465	13,751	1,09,127	1,20,775	10,603	13,271	1,05,566	1,15,921	199	313	3,328	4,783
E-Cart												
Atul Auto Ltd	265	344	2,124	2,855	188	274	1,963	2,945	-	-	-	-
Bajaj Auto Ltd.	-	34	-	98	-	23	-	33	-	1	-	1
Baxy Ltd	76	30	857	391	80	19	832	382	-	-	-	-
Mahindra & Mahindra Ltd	103	111	868	1,408	65	83	965	1,427	-	-	-	-
Total E-Cart	444	519	3,849	4,752	333	399	3,760	4,787	-	1	-	1
Total Three Wheelers	83,252	1,08,154	9,62,801	11,83,915	57,788	74,573	6,78,607	7,59,958	26,024	38,766	2,78,006	4,22,381

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CATEGORY SEGMENT / SUBSEGMENT MANUFACTURER	PRODUCTION				DOMESTIC SALES				EXPORTS			
	FEBRUARY		APRIL-FEBRUARY		FEBRUARY		APRIL-FEBRUARY		FEBRUARY		APRIL-FEBRUARY	
	2025	2026	2024-25	2025-26	2025	2026	2024-25	2025-26	2025	2026	2024-25	2025-26
Two Wheelers												
A: Scooters												
Ather Energy Pvt. Ltd	13,965	26,484	1,42,567	2,34,801	13,482	26,467	1,38,580	2,29,373	-	160	768	2,632
Bajaj Auto Ltd	21,645	28,075	2,50,866	2,74,061	21,440	28,130	2,48,100	2,70,884	1	108	5	1,024
Hero MotoCorp Ltd	35,175	58,544	3,78,198	5,57,777	34,061	53,677	3,51,696	5,16,064	1,695	4,783	28,012	44,399
Honda Motorcycle & Scooter I Pvt Ltd	2,38,495	3,07,895	29,26,980	31,75,618	1,90,597	2,82,676	26,35,734	28,70,909	24,290	32,486	2,96,267	3,32,814
India Yamaha Motor Pvt Ltd	28,458	36,423	3,52,389	3,42,095	24,168	30,421	2,86,569	2,88,718	4,920	7,521	63,448	66,041
Okinawa Autotech Pvt. Ltd	201	NA	6,250	112	393	NA	6,241	73	-	-	-	-
Piaggio Vehicles Pvt Ltd	3,377	3,877	42,578	42,436	2,272	2,813	28,344	29,467	920	1,068	14,557	13,448
Suzuki Motorcycle India Pvt Ltd	90,814	1,08,343	9,81,041	11,20,337	71,399	99,362	9,20,443	10,54,184	3,474	8,792	46,030	68,928
TVS Motor Company Ltd	1,73,371	2,20,200	17,34,292	21,65,468	1,54,971	2,06,228	16,51,022	20,96,851	9,444	13,667	86,189	98,398
Total A: Scooters	6,05,501	7,89,841	68,15,161	79,12,705	5,12,783	7,29,774	62,66,729	73,56,523	44,744	68,585	5,35,276	6,27,684
B: Motorcycles												
Bajaj Auto Ltd	2,70,869	3,53,776	34,12,293	36,86,311	1,24,698	1,58,034	18,76,490	18,57,135	1,53,279	1,93,649	15,41,982	18,07,334
Hero-MotoCorp. Ltd..	3,80,787	4,67,805	50,43,087	52,52,227	3,23,235	4,63,291	47,48,906	49,97,479	30,309	36,465	2,22,138	3,12,692
Honda Motorcycle & Scooter I Pvt Ltd	2,09,178	2,45,413	24,76,368	25,92,020	1,93,321	2,30,541	22,89,507	23,68,840	14,241	21,675	1,82,708	2,50,573
India Kawasaki Motors Pvt Ltd	459	574	3,233	2,577	266	565	3,951	4,583	-	-	-	-
India Yamaha Motor Pvt Ltd	47,415	60,452	5,70,624	5,94,352	26,290	36,651	3,55,909	3,45,709	17,816	19,215	2,04,237	2,51,989
Piaggio Vehicles Pvt Ltd	1,596	1,206	11,062	9,416	201	196	3,290	2,350	1,498	1,008	7,743	7,081
Royal-Enfield (Unit of Eicher Motors)	91,003	1,06,087	9,12,509	11,30,246	80,799	91,248	8,14,707	10,06,937	9,871	9,657	94,171	1,19,408
Suzuki Motorcycle India Pvt Ltd	17,847	17,985	1,67,459	1,91,883	1,816	1,709	19,243	15,292	13,277	13,436	1,44,275	1,72,771
Triumph Motorcycles I Pvt Ltd	43	136	459	282	95	154	1,080	708	-	-	-	-
TVS Motor Company Ltd	1,89,341	2,21,955	20,19,345	24,41,546	87,529	1,14,148	11,03,949	12,97,242	1,05,431	1,27,134	8,94,545	11,82,823
Total B: Motorcycles	12,08,538	14,75,389	1,46,16,439	1,59,00,860	8,38,250	10,96,537	1,12,17,032	1,18,96,275	3,45,722	4,22,239	32,91,799	41,04,671
C: Mopeds												
TVS Motor Company Ltd	44,423	46,364	4,85,683	4,78,810	33,572	45,095	4,66,632	4,77,048	942	1,590	6,516	19,452
Total C: Mopeds	44,423	46,364	4,85,683	4,78,810	33,572	45,095	4,66,632	4,77,048	942	1,590	6,516	19,452
Total Two Wheelers	18,58,462	23,11,594	2,19,17,283	2,42,92,375	13,84,605	18,71,406	1,79,50,393	1,97,29,846	3,91,408	4,92,414	38,33,591	47,51,807
Quadricycle												
Bajaj Auto Ltd	351	1,256	6,371	6,365	3	-	120	4	258	1,212	6,242	6,162
Total Quadricycle	351	1,256	6,371	6,365	3	-	120	4	258	1,212	6,242	6,162
Grand Total	23,46,258	28,64,612	2,73,73,519	3,03,51,351	17,73,650	23,01,355	2,24,50,972	2,45,51,735	4,74,328	6,08,284	48,10,153	60,03,994

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