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■ **"Material Innovation Will Drive the Future of Automotive Manufacturing"**
- Mr. Udayan Pathak
Executive Director, Udayan Pathak & Associates

■ **Industry Leaders Decode the Future of Indian Mobility :
15th Special Steels Convention**



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D.A. Chandekar Editor

The foundry industry remains the silent backbone of India's automotive story, with nearly 50 percent of all castings in the country finding their way into cars, commercial vehicles, and two-wheelers. From engine blocks and cylinder heads to brake housings, steering knuckles, and transmission cases, almost every moving part that bears load or heat begins life in a foundry. The sector today is a mix of about 4,500 units, ranging from small job shops in Coimbatore and Rajkot to large, automated plants supplying global OEMs. Capacity utilization has improved over the last two years as domestic vehicle sales recovered and exports picked up, especially for machined aluminum and ductile iron components. Yet the present is not without pressure. Input costs for pig iron, ferro alloys, and coke remain volatile, power tariffs and carbon compliance add to overheads, and the shortage of skilled pattern makers and metallurgists continues to constrain quality upgrades. At the same time, stricter emission norms, demand for lightweighting, and the push for zero-defect supply chains have forced foundries to invest in simulation, robotic fettling, and in-process inspection. The result is a bifurcation: organized players with capital are scaling and exporting, while smaller units are being compelled to consolidate or specialize.

Two policy and technology shifts are now reshaping casting demand in ways we have not seen in decades. The first is electrification. An internal combustion engine vehicle is a casting-heavy machine, but an EV replaces much of that with fewer, larger, and more complex aluminum parts. Traditional gray iron engine blocks and transmission housings will decline,

but demand is surging for battery tray housings, motor housings, e-axis cases, inverter cases, and large structural die-castings that integrate multiple parts into one. This favors high-pressure die casting and squeeze casting over sand casting, and it favors aluminum and magnesium over iron. Foundries that have retooled for thin-wall, leak-proof, heat-treated aluminum components are seeing order books fill, while those tied only to ICE powertrains are having to pivot fast. The second driver is the Vehicle Scrappage Policy. By incentivizing the retirement of vehicles older than 15 years for commercial use and 20 years for personal use, the policy is creating a replacement cycle. That directly translates into higher production of new vehicles in the near term, and therefore higher casting offtake. Equally important, it is formalizing the scrap ecosystem. More regulated dismantling means better quality ferrous and non-ferrous scrap for foundries, which can lower metal costs and support circularity goals, provided melting and sorting infrastructure keeps pace.

Looking ahead, the foundry sector will not shrink, it will transform. The auto industry's shift to EVs, hybrids, and even hydrogen platforms does not eliminate castings, it changes the alloy mix and the geometry. Lightweighting will remain non-negotiable as range and efficiency dominate, so aluminum castings are set to grow faster than the overall vehicle market. At the same time, customers are demanding foundries that are digital and green. We will see wider adoption of 3D printed sand cores, AI-driven defect prediction, digital twins for gating and solidification, and captive renewable power to meet OEM ESG mandates. Exports will be a key lever, as global automakers look to India for cost-competitive, machined castings that meet PPAP and IATF standards. Consolidation is inevitable too, with capital-intensive technologies favoring larger, integrated facilities that can do design, casting, heat treatment, and machining under one roof.

The conclusion is straightforward. Foundries that treat the EV transition and scrappage policy as a threat will struggle, those that treat them as a design challenge will lead. The next decade will reward agility in alloy selection, mastery in process control, and the courage to invest ahead of demand. With automotive still accounting for half of all castings, the health of the foundry industry and the health of the auto sector will remain deeply intertwined. The road ahead is lighter, cleaner, and more electric, but it will still be built, quite literally, in metal.

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"Material Innovation Will Drive the Future of Automotive Manufacturing"

Mr. Udayan Pathak

Executive Director,
Udayan Pathak & Associates

Udayan Pathak is the Executive Director of Udayan Pathak & Associates and former Chief – World Class Quality (Engineering Research Centre) at Tata Motors. With extensive experience across leading organisations including Tata Motors, John Deere, Bharat Forge, Spicer India, and DGP Hinoday, he has built a distinguished career in automotive engineering, quality systems, and manufacturing excellence. A Fellow of the Institution of Engineers (India) and ASM International, he is also a certified trainer and assessor for several AIAG CQI special process standards, including CQI-9, CQI-11, CQI-12, CQI-15, and CQI-27.

The automotive industry is undergoing one of the most significant transformations in its history. Stringent emission regulations, rapid electrification, evolving safety standards, and increasing digitalisation are redefining vehicle design and manufacturing. At the heart of this transformation lies the development of advanced materials capable of delivering higher strength, lower weight, improved safety, and greater sustainability. For the metals industry, these changing requirements present both new challenges and exciting opportunities for innovation.

In this interaction with Metalworld, Mr. Udayan Pathak, Executive Director, Udayan Pathak & Associates and former Chief – World Class Quality (ERC), Tata Motors, shares his perspectives on the evolving relationship between the automotive and metals industries, the growing importance of advanced materials, and the technological innovations that will shape the next generation of mobility.



Q. How is the automotive sector driving the demand for advanced metals and lightweight materials?

The automotive industry has always evolved in response to changing customer expectations and regulatory requirements. Today, manufacturers are addressing increasingly stringent emission norms, higher safety standards, and the demand for improved vehicle performance.

These requirements have resulted in higher operating temperatures and pressures within powertrains, more sophisticated braking systems, and stronger occupant protection during high-speed collisions. Meeting these



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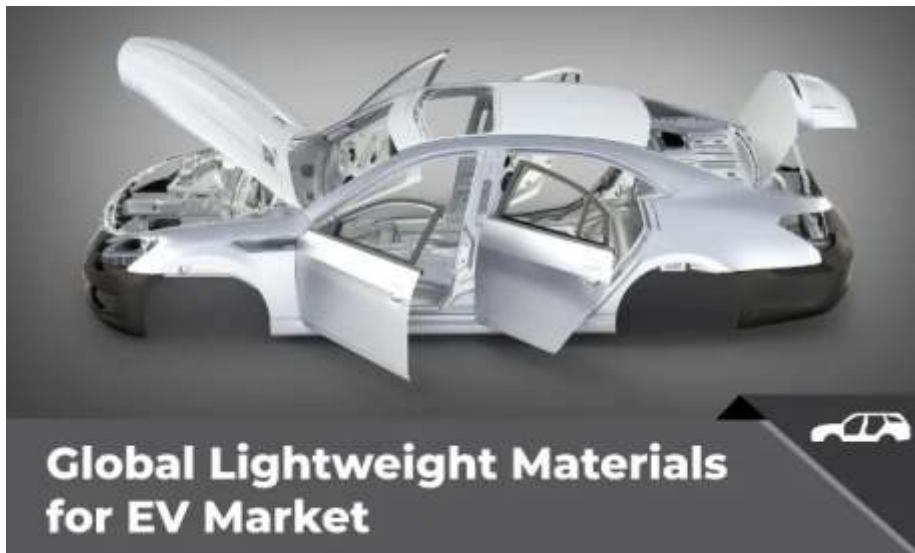
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challenges requires materials that offer superior mechanical performance while contributing to overall vehicle efficiency.

Advanced metals and lightweight materials therefore play a crucial role in enabling manufacturers to improve safety, reliability, and fuel efficiency without compromising structural integrity.

Q. What are the biggest material challenges facing the automotive industry today?

Perhaps the greatest challenge can be summarised in a single statement—developing materials with a high strength-to-weight ratio while maintaining excellent stiffness.

Although this appears straightforward, it represents one of the industry's most complex engineering challenges. Vehicle manufacturers aim to reduce weight to improve fuel efficiency and electric vehicle range, while simultaneously increasing structural strength to enhance safety.

Balancing these often contradictory requirements demands continuous advances in metallurgy, material science, and manufacturing technologies. The development of stronger, lighter, and more durable materials will remain a key focus area for the automotive industry.

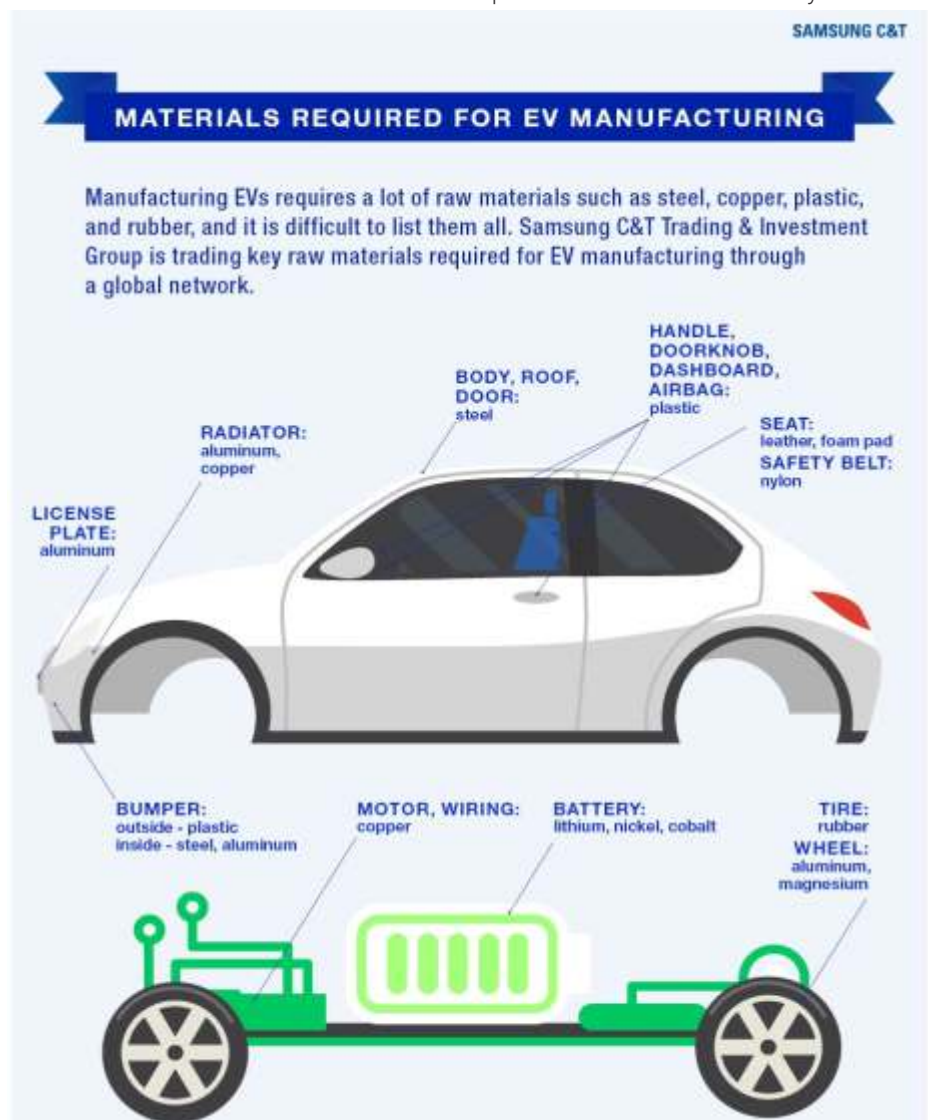
Q. How will the rise of electric vehicles reshape the metals and materials landscape?

Electric vehicles are often viewed as the definitive solution for the future of mobility. While they offer significant

Indian manufacturers are strengthening their internal quality systems. Initiatives such as Tata Motors' World Class Quality (WCQ) ecosystem demonstrate how quality excellence can be integrated across product design, engineering, and manufacturing to improve overall product reliability.

advantages in reducing tailpipe emissions, they also introduce an entirely new set of material requirements.

As conventional internal combustion engine components such as crankcases, cylinder heads, crankshafts, camshafts, and gearbox housings become less prominent, demand patterns will shift considerably. At the





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same time, battery systems substantially increase vehicle weight.

To compensate for this additional mass, manufacturers will increasingly rely on high-strength and ultra-high-strength steels to reduce body weight while maintaining safety and structural performance.

The transition to electric mobility therefore represents not simply a change in propulsion technology, but a fundamental shift in material utilisation across the automotive sector.

Q. Which material innovations do you believe will define the future of automotive manufacturing?

Electric mobility introduces several new technical challenges that require innovative material solutions.

One important area is electrical safety. High-voltage traction systems increase the risk of electric shock and fire under certain operating or accident conditions. This creates opportunities for developing electrically insulated steel products for body and passenger cabin applications.

Another growing requirement is electromagnetic interference (EMI) protection. Modern vehicles contain anywhere from 40 to over 300 electronic control units, along with numerous electric motors. As electronic content continues to increase, EMI shielding materials and coated steels will become increasingly important.

Equally important is stronger collaboration between automotive manufacturers, material developers, researchers, and start-ups. A common innovation platform would significantly accelerate the development and commercialisation of next-generation automotive materials.

Q. How can Indian automakers improve quality while remaining globally competitive?

Electric Car



Quality has become a central focus throughout the automotive supply chain.

Many vehicle recalls and warranty-related issues continue to originate from special manufacturing processes such as casting, forging, heat treatment, plating, welding, brazing, and coating. Consequently, process-specific quality standards such as the CQI series—including CQI-9, CQI-11, and CQI-12—are being increasingly adopted across the industry.

Another major trend is the increasing collaboration between Indian OEMs and global technology specialists. Rather than developing every system in-house, manufacturers are leveraging the expertise of leading international suppliers in areas such as steering systems, axles, transmissions, and braking technologies.

Simultaneously, Indian manufacturers are strengthening their internal quality systems. Initiatives such as Tata Motors' World Class Quality (WCQ) ecosystem demonstrate how quality excellence can be integrated across product design, engineering, and manufacturing to improve overall product reliability.

Q. What is your outlook on the future of India's automotive sector and its material requirements?

The future direction of the automotive industry remains dynamic.

While electric vehicles are expected to play an increasingly important role, other technologies such as fuel cell vehicles and the conversion of existing internal combustion vehicles into electric or alternative fuel platforms are also being actively explored. Considering India's large existing vehicle fleet, retrofitting older vehicles may emerge as a practical complement to complete replacement.

Although the exact technology pathway is still evolving, one trend is certain—the demand for advanced materials will continue to increase.

The composition of those materials may change, with different materials gaining or losing market share as technologies evolve, but metallurgy will remain central to the future of mobility. Companies that anticipate these changes and invest in material innovation will be best positioned to support the automotive industry's next phase of growth. ■



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ALEMAI Launches 'ALUMINIUM BHARAT 2026' to Strengthen India's Value-Added Aluminium Sector

The Aluminium Extrusion Manufacturers Association of India (ALEMAI) has announced ALUMINIUM BHARAT 2026, a national initiative aimed at strengthening India's aluminium midstream and downstream manufacturing ecosystem while supporting the country's vision of Atmanirbhar Bharat and Viksit Bharat 2047.

The initiative was unveiled during a curtain-raiser event in Mumbai ahead of the flagship exhibition, which will be held from 26–29 September 2026 at the Helipad Exhibition Centre, Gandhinagar (Ahmedabad), Gujarat, alongside ALUMEX INDIA 2026.

India possesses one of the world's largest bauxite reserves and ranks among the leading producers of alumina, providing a strong foundation for aluminium manufacturing. However, the association observed that domestic aluminium processors, particularly MSMEs, continue to face challenges arising from high raw material prices, elevated energy costs, financing expenses, and multiple fiscal levies.

ALUMINIUM BHARAT 2026 is being positioned as a comprehensive platform covering the entire aluminium value chain. The exhibition is expected to bring together primary aluminium producers, extrusion and rolling companies, recyclers, equipment suppliers, technology providers, policymakers, financial institutions, and international buyers to discuss



opportunities for strengthening India's downstream aluminium industry.

Through the initiative, ALEMAI has identified four key areas requiring policy attention. These include rationalising duties on primary aluminium and raw materials, reducing energy and financing costs for manufacturers, encouraging greater domestic consumption of value-added aluminium products, and aligning India's aluminium strategy with global trends that increasingly favour downstream manufacturing and exports of value-added products.

One of the principal concerns highlighted by the association relates to the duty structure governing raw materials and finished aluminium products. According to ALEMAI, several downstream aluminium products imported under Free Trade Agreements (FTAs) with ASEAN nations, the UAE, and other partner countries attract zero or minimal customs duty, while primary aluminium and several raw material categories continue to be subject to import duties. The association believes this has created cost disadvantages for domestic value-added manufacturers competing in both domestic and export markets.

The industry body also pointed to the under-utilisation of India's aluminium extrusion capacity. Although the country has an installed extrusion capacity of nearly 3 million tonnes per annum, current production is estimated at 1.2–1.3 million tonnes, while imports of downstream aluminium products are

estimated at around 1.5 million tonnes annually. ALEMAI attributes this gap to structural issues including raw material costs, tariff imbalances, high energy prices, and increasing competition from imported products.

The association further noted that several leading aluminium-producing countries have adopted policies encouraging downstream value addition and exports of finished aluminium products rather than primary metal. According to ALEMAI, a similar approach could help India leverage its abundant mineral resources to build a globally competitive aluminium manufacturing ecosystem while generating greater employment, investment, and technological advancement.

Through ALUMINIUM BHARAT 2026, ALEMAI aims to facilitate dialogue between industry stakeholders and policymakers on measures required to strengthen India's aluminium value chain and enhance the competitiveness of its downstream manufacturing sector.

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MRAI Seeks Removal of Import Duty on Aluminium Scrap



The Material Recycling Association of India (MRAI) has urged the Government to remove the existing 2.5% Basic Customs Duty (BCD) on aluminium scrap, stating that the measure would improve raw material availability, strengthen the domestic recycling industry, and enhance the competitiveness of downstream aluminium manufacturers.

In a representation submitted to the Prime Minister's Office, the association highlighted the growing importance of recycled aluminium in India's manufacturing sector.

According to MRAI, secondary aluminium production has increased from 0.85 million tonnes in FY16 to nearly 2.2 million tonnes in FY26, and now accounts for approximately 35% of the country's aluminium consumption. The sector also supports nearly 700,000 direct and indirect jobs, with women constituting a significant share of the skilled workforce engaged in recycling operations.

MRAI noted that India currently imports nearly 80–85% of its aluminium scrap requirement, making imported scrap an essential raw material for foundries, rolling mills, extruders, and downstream manufacturers. The association pointed out that aluminium scrap remains the only major non-ferrous metal scrap category still subject to import duty, while

copper, zinc, and lead scrap have already been exempted. It also observed that several competing manufacturing nations, including Thailand, Malaysia, Indonesia, Japan, and South Korea, permit duty-free imports of aluminium scrap, providing their recycling industries with a cost advantage.

The association has expressed concern that the existing duty increases raw material costs for recyclers and MSMEs, affecting the competitiveness of India's value-added aluminium sector. It also highlighted that a Joint Working Group constituted by the Ministry of Mines had recently examined the issue and recommended that the removal of the 2.5% duty be considered in the larger national interest.

According to MRAI, global demand for recycled aluminium continues to rise, driven by increasing emphasis on resource efficiency and low-carbon manufacturing. Domestic availability of aluminium scrap remains limited, while demand from sectors such as automotive, construction, engineering, packaging, and infrastructure continues to grow.

Industry representatives also noted that recycled aluminium consumes up to 95% less energy and generates up to 90% lower carbon emissions compared with primary aluminium production, making it an important contributor to India's decarbonisation objectives. NITI Aayog has also identified recycled aluminium as a key element in the country's roadmap towards achieving Net Zero emissions by 2070.

MRAI further stated that rationalising the duty structure would strengthen MSMEs, encourage investment in recycling infrastructure, improve resource security, and support the growth of India's downstream aluminium manufacturing industry while advancing the objectives of Make in India and Atmanirbhar Bharat.

Vedanta Reaffirms Commitment to Unlock India's Hydrocarbon Potential



On the occasion of Global Energy Independence Day, Vedanta reiterated its commitment to supporting India's energy security by accelerating domestic oil and gas exploration and production. The company also reaffirmed the ambition of its oil and gas business, Vedanta Oil

& Gas, to achieve production of 500,000 barrels of oil equivalent per day (boepd) as part of its long-term growth strategy.

India currently imports nearly 90 percent of its crude oil and natural gas requirements, making energy security a strategic priority for the country.

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According to Vedanta, India possesses an estimated 300 billion barrels of oil equivalent in hydrocarbon resources, presenting significant opportunities to expand domestic production and reduce dependence on imports.

Vedanta Oil & Gas, formerly known as Cairn Oil & Gas, plans to support this objective through accelerated exploration, enhanced oil recovery techniques, and the deployment of advanced technologies. The company believes that increasing domestic hydrocarbon production can strengthen energy security, improve industrial competitiveness, generate employment, and contribute to long-term economic growth.

Commenting on the occasion, Anil Agarwal, Chairman, Vedanta, said that achieving energy independence is an economic and strategic imperative for India. He noted that greater domestic

production of oil and gas would reduce import dependence while strengthening the country's economic resilience. He also highlighted India's strong technical expertise in the global oil and gas sector and emphasised the need to responsibly develop the country's natural resource base.

Vedanta observed that large parts of India's sedimentary basins remain underexplored, offering considerable scope for future exploration. The company also welcomed recent policy initiatives aimed at opening additional deepwater and ultra-deepwater blocks for exploration, which are expected to support higher investment in the country's energy sector.

The company stressed that achieving long-term energy independence will require continued collaboration between industry, government, technology providers, and

entrepreneurs. Vedanta has consistently advocated responsible resource development alongside technological innovation to improve domestic energy production while supporting sustainable economic development.

Vedanta Oil & Gas currently operates one of India's largest private upstream portfolios, with interests in 44 onshore and offshore blocks covering nearly 47,000 square kilometres across Rajasthan, Gujarat, Assam, and Andhra Pradesh. The portfolio includes both conventional and unconventional hydrocarbon resources.

As India's leading private sector oil and gas producer, the company continues to focus on responsible operations, improving production efficiency, and supporting the country's long-term energy security objectives. ■

Automotive Semiconductor Manufacturing Gains Strategic Momentum

India is steadily strengthening its position in the global semiconductor ecosystem as the automotive industry increases its focus on local sourcing of electronic components. With modern vehicles relying heavily on semiconductors for engine management, advanced driver assistance systems (ADAS), infotainment, battery management systems, and connected vehicle technologies, the availability of reliable chip supplies has become a strategic priority for automobile manufacturers. Following the global semiconductor shortage experienced in recent years, automakers and component suppliers are actively diversifying their sourcing strategies while encouraging domestic manufacturing. Supported by government initiatives and investments in semiconductor fabrication and packaging facilities, India is building capabilities across the electronics value chain to reduce dependence on



imports. Leading automotive OEMs and Tier-1 suppliers are collaborating with electronics manufacturers to develop locally sourced electronic control units (ECUs), sensors, power electronics, and microcontrollers for both conventional and

electric vehicles. Increased localisation is expected to improve supply chain resilience, reduce production disruptions, and support India's ambition of becoming a global manufacturing hub. Industry experts believe the growth of domestic semiconductor manufacturing will significantly benefit the automotive sector by ensuring greater supply security and fostering innovation in connected, autonomous, and electric mobility. As vehicle electronics continue to evolve, India's semiconductor ecosystem is expected to play an increasingly important role in supporting future automotive production and strengthening the country's industrial competitiveness. ■

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Industry Leaders Decode the Future of Indian Mobility : 15th Special Steels Convention

Ashlesha Kamble,
Editorial Assistant
Steelworld

The 15th Special Steels Convention 2026, organised by Steelworld in association with the Alloy Steel Producers Association of India (ASPA) and supported by Forgings Today, served as a significant platform for discussions on the future of India's manufacturing and mobility ecosystem. Held on 29 May 2026 at The Pride Hotel, Pune, the convention brought together leading steel manufacturers, automotive OEMs, technology providers, researchers, and policymakers to deliberate on emerging industry trends, sustainable manufacturing practices, and next-generation material technologies.

Among the convention's most engaging sessions was the panel discussion on "Future of Automotive Sector in India," moderated by Mr. Udayan Pathak, Former Head – World Class Quality (ERC), Tata Motors,

Pune, and an internationally recognised expert in automotive materials and lightweighting. Drawing on his extensive experience in automotive engineering, manufacturing technologies, and quality systems, Mr. Pathak steered the discussion through key issues shaping the future of India's automotive industry.

The distinguished panel featured Dr. S. V. B. R. Krishna Koorella, Head - Materials Engineering Department, Ashok Leyland Limited; Dr. S. S. Thipse, Senior Deputy Director, Automotive Research Association of India (ARAI); and Mr. Prasanth Karakavalasa, India Materials Science & Engineering Leader. The session became particularly interactive as Mr. D. A. Chandekar, Editor, Steelworld & Metalworld, and Dr. Narra Rajesh, Director - Technical, UltiMet Smart



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Techno Pvt. Ltd., raised thought-provoking questions on future mobility technologies, emission regulations, alternative fuels, vehicle scrappage policies, localisation, and the increasing role of advanced materials in automotive manufacturing.

Setting the tone for the discussion, Prasanth Karakavalasa highlighted the profound transformation taking place across the global automotive industry. He observed that sustainability, digitalisation, changing customer expectations, and increasingly stringent emission regulations are reshaping product development and manufacturing strategies. Referring to India's successful transition from Bharat Stage-IV to Bharat Stage-VI emission norms, he explained that well-designed regulatory frameworks have acted as catalysts for technological advancement, enabling Indian manufacturers to strengthen their global competitiveness while significantly improving vehicle efficiency and environmental performance.

Speaking from the perspective of a commercial vehicle manufacturer, Dr. S. V. B. R. Krishna Koorella expressed confidence in India's long-term automotive growth story. While acknowledging the rapid progress being made in electric mobility and hydrogen-powered transportation, he emphasised that internal combustion engine technologies will continue to remain relevant for the foreseeable future. According to him, India's diverse geographical conditions, infrastructure, and

mobility requirements make it unlikely that a single technology will dominate the market. Instead, he envisioned a future mobility ecosystem supported by multiple energy sources, including diesel, biodiesel, ethanol, methanol, electricity, hydrogen, and other alternative fuels. Such a diversified approach, he noted, would provide greater flexibility while supporting both sustainability and energy security.

The discussion also explored the policy environment that will shape the industry's future. The panellists agreed that consistent and progressive government policies have played a crucial role in encouraging innovation across the automotive value chain. They observed that future regulations should continue to balance environmental objectives with industrial competitiveness, enabling manufacturers to invest confidently in new technologies while maintaining affordability for consumers.



Offering a broader technological perspective, Dr. S. S. Thipse highlighted the importance of adopting a holistic approach to sustainability throughout the vehicle lifecycle. He underlined the significance of India's Vehicle Scrappage Policy in promoting organised recycling, remanufacturing, and efficient utilisation of valuable raw materials. According to him, an effective scrappage ecosystem has the potential to reduce environmental impact, improve resource efficiency, and strengthen the country's circular economy.

A major focus of the discussion was the growing importance of advanced materials in modern vehicle engineering. Dr. Thipse explained that the increasing adoption of advanced high-strength steels, specialised alloy grades, lightweight materials, composite technologies, corrosion-resistant coatings, and innovative manufacturing processes is enabling automakers to develop vehicles that are safer, lighter, more fuel-efficient, and environmentally sustainable. As emission standards become more stringent and customer expectations continue to evolve, material innovation will play an increasingly important role in helping manufacturers



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INDUSTRY UPDATE

achieve performance, safety, and sustainability objectives simultaneously.

The panel also highlighted the close relationship between the automotive and steel industries. The transition towards next-generation mobility is expected to create significant demand for specialised steel products capable of meeting the evolving requirements of electric vehicles, hybrid powertrains, hydrogen mobility, and advanced commercial vehicles. This presents substantial opportunities for India's special steel industry to develop innovative material solutions that support lightweight design, enhanced durability, improved crash performance, and greater manufacturing efficiency.

Another key takeaway from the discussion was that the future of mobility will not be defined solely by electrification. Instead, technological diversity will remain essential as different vehicle segments and applications require different solutions. While battery electric vehicles are expected to play a significant role in urban mobility, hydrogen fuel cells, biofuels, hybrid technologies, and cleaner internal combustion engines are all likely to contribute to India's long-term transportation ecosystem. The panellists emphasised that sustained investment in research and development, indigenous technology, skill development, and collaborative



innovation will be critical in ensuring India's continued competitiveness in the global automotive landscape.

The session concluded on an optimistic note, with a shared belief that India's automotive sector is entering a transformative phase driven by innovation, sustainability, digital technologies, and advanced materials. As manufacturers adapt to evolving consumer expectations and global environmental commitments, closer collaboration between automakers, steel producers, research institutions, technology providers, and policymakers will become increasingly important. The insightful discussion reaffirmed that the future of Indian mobility will be built not only through cleaner powertrains but also through continuous advancements in materials engineering, manufacturing excellence, and integrated industrial development.

The panel discussion offered a comprehensive roadmap for the industry's future, highlighting that India's journey towards becoming a global automotive manufacturing powerhouse will be shaped by technological innovation, policy support, sustainable practices, and the continued evolution of its special steel ecosystem. It reinforced the message that the automotive and steel industries are not evolving independently but are progressing together towards a smarter, greener, and globally competitive future.





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Tata Motors Accelerates EV Expansion with New Product Pipeline



Tata Motors continues to strengthen its leadership in India's electric passenger vehicle market through an expanded product pipeline and sustained investments in next-generation mobility solutions. Building on the success of its existing electric vehicle portfolio, the company is preparing to introduce new models equipped with improved battery technology, enhanced driving range, faster charging capabilities, and advanced connected features.

The company is simultaneously increasing localisation across its EV supply chain to reduce costs and improve manufacturing efficiency. Strategic investments in battery

technology, charging infrastructure, and software integration are expected to support higher production volumes while making electric vehicles more accessible to Indian consumers.

India's growing focus on sustainable transportation, coupled with supportive government policies and rising environmental awareness, continues to create favourable conditions for EV adoption. Tata Motors remains at the forefront of this transition by investing in research and development, expanding manufacturing capacity, and collaborating with technology partners.

Industry analysts believe the company's aggressive EV roadmap will further intensify competition in the domestic electric vehicle market while accelerating innovation across the automotive sector. As consumer demand shifts towards cleaner mobility solutions, Tata Motors' continued investments are expected to strengthen India's position as a major electric vehicle manufacturing hub.

Lightweight Materials Drive the Next Generation of Vehicles



Automobile manufacturers are increasingly adopting lightweight materials to improve fuel efficiency, reduce emissions, and enhance vehicle performance. Advanced high-strength steel, aluminium alloys, and engineered materials are becoming essential components in modern vehicle design as manufacturers strive to meet stricter emission regulations while maintaining high safety standards.

Reducing vehicle weight enables improved energy efficiency across both conventional and electric vehicles. For electric vehicles in particular, lightweight structures help extend driving range, improve battery efficiency, and optimise overall vehicle performance without compromising structural integrity.

Steel manufacturers continue to develop advanced grades offering higher strength with reduced weight, while aluminium usage is expanding across body panels, chassis components, and powertrain applications. The growing adoption of lightweight materials is also driving innovation in joining technologies, forming processes, and manufacturing techniques.

Industry analysts believe lightweight engineering will remain a key priority for automotive manufacturers as demand for cleaner, safer, and more efficient vehicles continues to increase. The trend is expected to generate significant opportunities for steel producers, aluminium manufacturers, component suppliers, and engineering companies supporting the evolving automotive value chain.

Maruti Suzuki Strengthens Innovation Through AI and Battery Recycling Initiatives

Maruti Suzuki is expanding its focus beyond vehicle manufacturing by investing in emerging technologies that support digital transformation and sustainability. Through its startup incubation programme, the company has partnered with several technology startups working in areas such as artificial intelligence, advanced manufacturing, and circular economy solutions.

Among the key initiatives is the adoption of Agentic AI to improve procurement and business operations by automating complex decision-making processes and enhancing operational efficiency. Alongside digital innovation, Maruti Suzuki has also partnered with green technology startup MiniMines to

develop advanced recycling solutions for lithium-ion batteries. The collaboration aims to recover valuable metals from end-of-life batteries through environmentally sustainable processes, supporting India's growing electric mobility ecosystem.

These initiatives reflect the industry's broader shift towards integrating smart technologies with sustainable manufacturing practices. As vehicle manufacturers increasingly invest in digitalisation, resource efficiency, and circular economy models, such partnerships are expected to play an important role in enhancing competitiveness while supporting India's long-term environmental and industrial objectives.

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Mid-Year Price Hikes Add Pressure on India's Passenger Vehicle Market



Indian automobile buyers entered the second half of 2026 with another round of vehicle price increases, as several leading manufacturers revised prices across their product portfolios from July 1. Tata Motors announced a price increase of up to 1.5% across its passenger vehicle range, including both internal combustion engine (ICE) models and electric vehicles. Maruti Suzuki also revised prices on select models by up to ₹30,000, while BMW Group India implemented an increase of up to 2% across its lineup.

The revisions reflect a combination of persistent cost pressures affecting the automotive industry. Rising input costs, higher commodity prices, currency fluctuations, and increased logistics expenses continue to impact manufacturers' operating margins. Ongoing geopolitical uncertainties and disruptions to global shipping routes have further contributed to higher freight costs, prompting automakers to pass part of the burden on to consumers.

With financing costs remaining relatively high, the latest price revisions are expected to influence purchasing decisions, particularly in the entry-level and mid-segment categories. Industry experts believe demand is likely to remain resilient, although consumers may increasingly prioritise value, fuel efficiency, and long-term ownership costs when making buying decisions.

The Resurgence of the Small Car: Rural Demand Revives Entry-Level Mobility

After years of premiumisation dominating India's passenger vehicle market, the entry-level hatchback segment is showing signs of a strong revival. Recent sales trends indicate a significant year-on-year increase in demand for small cars, driven primarily by buyers in rural and semi-urban markets. The recovery reflects improving disposable incomes, favourable agricultural conditions, and renewed consumer confidence across Tier-2 and Tier-3 cities.

Recognising this shift, leading manufacturers are strengthening production of affordable models to meet rising demand. Maruti Suzuki, the country's largest passenger vehicle manufacturer, has increased

focus on popular models such as the Alto and S-Presso, reinforcing its commitment to value-driven mobility. The renewed interest in compact vehicles highlights the continued importance of affordability, fuel efficiency, low maintenance costs, and ease of ownership for a large section of Indian consumers.

While premium SUVs continue to attract urban buyers, the resurgence of small cars demonstrates that India's automotive growth remains deeply rooted in practical transportation needs. The segment continues to play a vital role in first-time vehicle ownership and is expected to remain a key contributor to domestic automobile volumes as rural demand strengthens further.

Auto Component Industry Sees Strong Export Growth

India's auto component industry continues to strengthen its position in the global automotive supply chain as exports register steady growth across key international markets. Increasing demand from Europe, North America, and Southeast Asia, combined with the global diversification of sourcing strategies, has created significant opportunities for Indian manufacturers.

Leading component manufacturers are expanding production capacities while investing in automation, precision engineering, and advanced manufacturing technologies to meet international quality standards. Strong capabilities in castings, forgings, machining, aluminium components, and specialised steel products have further enhanced India's competitiveness in global markets.

The industry's growing emphasis on localisation, quality certification, and sustainable manufacturing practices is attracting new business from global original equipment manufacturers (OEMs). At the same time, favourable government initiatives and infrastructure improvements continue to support export-oriented manufacturing.

Industry experts believe India's auto component sector is well positioned to benefit from long-term shifts in global supply chains. As international manufacturers seek reliable and cost-effective sourcing partners, Indian suppliers are expected to play an increasingly important role in supporting vehicle production worldwide while contributing significantly to export earnings and industrial growth.

Global Automakers Increase Sourcing from India's Manufacturing Base



India is emerging as an increasingly important sourcing destination for global automobile manufacturers seeking to diversify supply chains and strengthen manufacturing resilience. Supported by competitive production costs, a skilled workforce, and a rapidly expanding supplier ecosystem, Indian manufacturers are securing larger export orders for automotive components, castings, forgings, precision-machined parts, and engineered products.

Global original equipment manufacturers (OEMs) are expanding procurement from India as part of broader supply chain diversification strategies. Investments in automation, quality systems, digital manufacturing, and advanced materials have enabled Indian suppliers to meet stringent international standards while remaining cost competitive.

The country's growing expertise in producing high-value engineering products is also encouraging multinational companies to establish long-term sourcing partnerships with domestic manufacturers. Increasing localisation of critical components is further strengthening India's manufacturing capabilities while reducing dependence on imports.

Industry experts believe this trend will continue as global automotive production shifts towards more diversified supply chains. Rising exports, expanding manufacturing capacity, and greater integration with international OEMs are expected to reinforce India's position as a preferred global manufacturing hub while creating new opportunities across the metals, engineering, and automotive sectors.

Commercial Vehicle Demand Gains Momentum with Infrastructure Push

India's commercial vehicle industry is witnessing renewed momentum as large-scale infrastructure development, logistics expansion, mining activities, and industrial growth continue to generate strong demand for trucks and heavy-duty vehicles. Government investments in highways, freight corridors, urban infrastructure, and construction projects are creating fresh opportunities across the commercial transportation sector.

Fleet operators are increasingly replacing ageing vehicles with modern trucks offering improved fuel efficiency, higher payload capacity, advanced safety features, and lower operating costs. Manufacturers are responding by introducing technologically advanced models designed to improve productivity while meeting



stricter emission norms.

Demand from sectors such as e-commerce, warehousing, cement, steel, agriculture, and mining is further supporting sales growth across medium and heavy commercial vehicle categories. In addition, increasing digitalisation through connected fleet management systems is

enabling operators to improve vehicle utilisation and reduce maintenance costs.

Industry analysts expect commercial vehicle demand to remain positive over the coming quarters, supported by continued infrastructure spending and economic activity. The segment is expected to play a crucial role in strengthening India's logistics ecosystem while driving demand for steel, castings, forgings, tyres, and other automotive components.

The European Auto Industry Faces a New Era of Restructuring



Europe's automotive industry is entering a period of significant transformation as Volkswagen undertakes one of the most extensive restructuring exercises in its history. The company has announced plans to streamline its manufacturing operations, including the possible closure of several production facilities in Germany and substantial workforce reductions as part of its long-term cost optimisation strategy.

The decision reflects mounting challenges facing European automakers, including rising energy prices, increasing labour costs, slower-

than-expected demand for electric vehicles, and intensifying competition from global manufacturers. Companies are also investing heavily in electrification, software development, and next-generation mobility technologies, placing additional pressure on profitability.

Industry experts believe Volkswagen's restructuring highlights the broader challenges confronting Europe's automotive manufacturing base. As manufacturers seek to remain globally competitive, improving operational efficiency and accelerating technological innovation have become strategic priorities. The coming years are expected to witness further consolidation, investment in advanced manufacturing, and renewed focus on sustainable production as Europe's automotive sector adapts to rapidly evolving market conditions. ■

Automotive Suppliers Accelerate Investment in Lightweight Components



Global automotive suppliers are increasing investments in lightweight component manufacturing as vehicle manufacturers seek to improve fuel efficiency, reduce emissions, and enhance electric vehicle performance. Advanced high-strength steel, aluminium alloys, magnesium, and composite materials are increasingly being used to reduce vehicle weight while maintaining structural strength and safety.

Suppliers are expanding capabilities in casting, forging, extrusion, precision machining, and advanced forming

technologies to meet the evolving requirements of modern vehicle platforms. The shift towards lightweight engineering is particularly important for electric vehicles, where weight reduction contributes directly to improved battery performance and extended driving range.

Industry experts expect demand for lightweight automotive components to continue rising as global emission regulations become more stringent and vehicle electrification accelerates. The trend is creating new growth opportunities for metal producers, component manufacturers, and engineering companies supporting the automotive industry's transition towards cleaner, safer, and more efficient mobility solutions. ■

Aluminium Demand Rises as Automakers Focus on Lightweight Vehicles



The global automotive industry is witnessing a significant rise in aluminium consumption as manufacturers increasingly adopt lightweight materials to improve vehicle efficiency and reduce carbon emissions. Aluminium's high strength-to-weight ratio, corrosion resistance, and recyclability make it an ideal material for body structures, chassis components, battery enclosures, and suspension systems.

The growing production of electric vehicles has further accelerated aluminium demand, as reducing vehicle weight helps improve battery efficiency and extend driving range. Leading automakers are incorporating more aluminium into vehicle designs while suppliers continue developing advanced alloys that offer improved strength, durability, and manufacturing performance.

Industry analysts expect automotive aluminium demand to grow steadily over the coming years, supported by stricter emission regulations, fuel efficiency standards, and the global shift towards sustainable mobility. The trend also presents significant opportunities for aluminium producers, extrusion manufacturers, and component suppliers serving the automotive sector. ■

Global EV Trade Faces Growing Geopolitical Challenges



The global electric vehicle industry is witnessing increasing trade tensions as governments introduce measures aimed at protecting domestic manufacturing. Recent tariff decisions by the United States and the European Union on Chinese-built electric vehicles have reshaped international supply chains and encouraged manufacturers to reassess their global production strategies.

In response, several Chinese automakers are expanding manufacturing and assembly operations

in countries such as Mexico, Hungary, and Southeast Asia to strengthen regional supply networks and improve market access. At the same time, regulators are introducing stricter rules governing product origin, battery sourcing, and local value addition.

The evolving trade environment reflects the growing strategic importance of electric vehicle manufacturing, battery technology, and critical mineral supply chains. While these developments may encourage greater regional investment, they could also increase production costs and create additional complexity for global manufacturers. Industry observers believe that balancing industrial competitiveness with open trade will remain a key challenge as countries continue to strengthen their domestic automotive ecosystems. ■

Chinese Automakers Expand Global Manufacturing Footprint



investing heavily in overseas manufacturing to strengthen regional supply chains, reduce logistics costs, and improve market access amid evolving trade policies.

The expansion is driven by rising international demand for Chinese vehicles, particularly electric vehicles (EVs), and the need to localise production to meet regional regulations and customer preferences. Several manufacturers are also forming strategic partnerships with local companies to enhance distribution networks and increase production capacity.

Industry experts believe the overseas expansion of Chinese automakers will intensify global competition while reshaping automotive supply chains. The trend is expected to generate new opportunities for suppliers of steel, aluminium, castings, forgings, batteries, and precision-engineered components, reinforcing the growing role of China in the global automotive manufacturing landscape. ■

Global Investments in EV Battery Gigafactories Continue to Rise



Global investments in electric vehicle battery gigafactories continue to accelerate as automakers and battery manufacturers seek to secure long-term supply chains for the rapidly growing EV market. Major companies across North America, Europe, and Asia are expanding large-scale battery production facilities to meet rising demand while reducing dependence on imported battery cells.

Governments are supporting these investments through incentives and industrial policies aimed at strengthening domestic battery manufacturing capabilities and enhancing energy security. New gigafactories are expected to create significant demand for steel, aluminium, copper, lithium, nickel, and other critical raw materials essential for battery production.

Industry analysts believe expanding battery manufacturing capacity will be critical to supporting global EV adoption, reducing production costs, and improving supply chain resilience. The rapid growth of gigafactories is also expected to stimulate innovation in battery technology, recycling, and sustainable manufacturing processes. ■

Toyota Advances Solid-State Battery Development



Toyota has taken another important step towards the commercialisation of solid-state battery technology by commencing pilot-line production at its dedicated manufacturing facilities. The initiative marks significant progress in the company's long-term strategy to develop next-generation batteries capable of delivering higher performance, improved safety, and greater energy efficiency.

Unlike conventional lithium-ion batteries, solid-state batteries replace liquid electrolytes with solid materials, offering the potential for longer driving

ranges, faster charging times, and enhanced thermal stability. These characteristics could significantly improve the practicality and reliability of future electric vehicles.

Although large-scale commercial production remains several years away, pilot manufacturing enables engineers to refine production techniques, improve material performance, and address cost challenges before mass deployment. Industry analysts consider solid-state batteries among the most promising technological advancements in electric mobility, with the potential to accelerate global EV adoption once manufacturing becomes commercially viable. Toyota's continued investment reinforces its commitment to advancing battery innovation as the automotive industry transitions towards cleaner and more sustainable transportation.

Rare Earth Minerals Become a Global Strategic Priority

Governments and industries worldwide are intensifying efforts to secure reliable supplies of rare earth elements (REEs), recognising their growing importance in advanced manufacturing, renewable energy, electric vehicles (EVs), semiconductors, aerospace, and defence technologies. Although rare earth elements are relatively abundant in the Earth's crust, economically viable deposits and processing capabilities are concentrated in only a few countries, making global supply chains increasingly vulnerable to geopolitical risks and trade disruptions.

The rapid expansion of electric mobility, wind power, consumer electronics, and high-performance industrial equipment has significantly increased demand for critical minerals such as neodymium, praseodymium, dysprosium, terbium, and yttrium. These elements are essential for manufacturing permanent magnets, high-efficiency electric motors, batteries, and sophisticated electronic components. As a result, governments are actively implementing policies aimed at strengthening domestic mining, refining, and recycling capabilities while reducing dependence on limited overseas suppliers.

Countries including the United States, Australia, Canada, Japan, and members of the European Union are investing heavily in exploration projects, mineral processing facilities, and strategic stockpiles. At the same time, mining companies are adopting advanced extraction technologies and environmentally responsible production practices to minimise environmental impacts while improving operational efficiency. Recycling initiatives focusing on recovering rare earth elements from end-of-life electronics, electric vehicle batteries, and industrial equipment are also gaining momentum as part of broader circular economy strategies.

Global Auto Component Industry Invests in Smart Manufacturing



Automotive component manufacturers worldwide are increasing investments in smart manufacturing technologies to enhance production efficiency, product quality, and operational flexibility. Industry 4.0 solutions, including artificial intelligence, robotics, automation, digital twins, and predictive maintenance, are transforming manufacturing operations across the global automotive supply chain.

Leading suppliers are adopting advanced digital technologies to optimise

production planning, reduce downtime, improve quality control, and minimise material waste. Smart factories also enable real-time monitoring and data-driven decision-making, helping manufacturers respond more effectively to changing market demands.

As vehicle technologies become increasingly sophisticated, the need for precision manufacturing and consistent product quality continues to grow. Industry experts believe digital transformation will strengthen supply chain resilience while improving productivity and competitiveness. The transition towards intelligent manufacturing is expected to play a crucial role in supporting future automotive production and the development of next-generation mobility solutions.

Foundry Clusters Strengthen India's Manufacturing Base

India's foundry industry is increasingly leveraging the benefits of industrial clustering to improve operational efficiency, enhance product quality, and strengthen its position in both domestic and international markets. Established foundry hubs such as Kolhapur, Coimbatore, Rajkot, Belagavi, Batala and Howrah continue to expand their capabilities, while newer manufacturing clusters are emerging in response to growing demand from the automotive, engineering, railways and infrastructure sectors.

The cluster model enables foundries—particularly micro, small and medium enterprises (MSMEs)—to share essential resources, reducing costs while improving access to advanced technologies. Common Facility Centres (CFCs) equipped with metallurgical laboratories, testing equipment, heat treatment facilities and environmental management systems are allowing smaller foundries to adopt practices that would otherwise require substantial capital



investment.

Another major advantage of cluster development is the creation of integrated manufacturing ecosystems. Pattern makers, machining units, raw material suppliers, tool manufacturers and logistics providers operate in close proximity, enabling faster production cycles and better coordination throughout the supply chain. Such collaboration helps foundries respond more efficiently to customer requirements while maintaining competitive lead times.

Industry associations also point out that clustered development encourages knowledge sharing and skill development. Technical workshops, joint training programmes

and collaborative research initiatives are helping foundries improve manufacturing practices and adopt international quality standards.

Several foundry clusters are witnessing investments in machining, inspection and finishing facilities, allowing manufacturers to supply value-added components rather than basic castings. This capability is particularly important for export-oriented businesses serving demanding sectors such as heavy engineering, pumps, valves and industrial equipment.

As India's manufacturing sector continues to expand under initiatives promoting domestic production and exports, industrial clusters are expected to remain an important catalyst for the foundry industry's long-term growth. By combining shared infrastructure with collaborative innovation, cluster-based development is helping Indian foundries become more competitive, productive and resilient in an increasingly global marketplace.

Quality Certifications Strengthen Export Competitiveness

As global manufacturing standards continue to evolve, Indian foundries are placing greater emphasis on quality certifications to enhance their competitiveness in domestic and international markets. Compliance with globally recognized standards such as ISO 9001, IATF 16949, ISO 14001 and industry-specific customer certifications is becoming increasingly important for foundries supplying cast components to automotive, engineering, railways and heavy equipment manufacturers.

Export-oriented foundries are investing in advanced quality management systems, laboratory infrastructure and traceability solutions to meet stringent customer

requirements. Overseas buyers are placing greater importance on process consistency, documentation and product reliability, making certification an essential business requirement rather than a regulatory formality.

Several medium-sized foundries have expanded their metallurgical laboratories by introducing spectrometers, tensile testing equipment, hardness testers and non-destructive testing facilities. These investments enable manufacturers to verify material properties at every stage of production while improving confidence among domestic and international customers.

Industry experts note that certification also strengthens internal

manufacturing practices. Standardised procedures improve process discipline, reduce variability and encourage continuous improvement across melting, moulding, fettling and inspection operations. This ultimately contributes to lower rejection rates and improved customer satisfaction.

The increasing participation of Indian foundries in global supply chains has also accelerated the adoption of digital documentation and production traceability systems. Customers increasingly require detailed records covering raw material sources, production parameters and quality inspection results before approving shipments.

Better Sand Management Improves Casting Quality



Foundry sand remains one of the most important materials used in casting production, and Indian foundries are placing greater emphasis on improving sand management practices to enhance product quality, reduce waste and optimise manufacturing costs. As customer expectations for defect-free castings continue to rise, maintaining consistent moulding sand properties has become a critical operational priority.

Many foundries are investing in modern sand preparation systems that provide better control over moisture,

grain size distribution and clay content. Consistent mould quality helps minimise common casting defects such as sand inclusion, erosion, penetration and surface irregularities, leading to improved production yields and reduced rejection rates.

Mechanical and thermal sand reclamation systems are also gaining wider acceptance, enabling foundries to recover larger quantities of moulding sand while maintaining performance standards. Besides lowering raw material consumption, reclaimed sand contributes to more sustainable production practices by reducing waste disposal requirements.

Routine laboratory testing has become increasingly sophisticated. Foundries are adopting advanced testing instruments to monitor sand permeability, compactability, strength and moisture levels throughout the production cycle. Regular analysis

allows operators to make timely adjustments, ensuring stable mould performance under varying production conditions.

Industry experts note that effective sand management also improves furnace productivity by reducing process interruptions associated with inconsistent mould behaviour. Better control over mould quality translates directly into improved dimensional accuracy and enhanced surface finish of finished castings.

As India's foundry industry continues to serve demanding sectors such as automotive, railways, power equipment and heavy engineering, process consistency is becoming a major competitive advantage. Efficient sand management not only supports higher-quality castings but also contributes to lower operating costs and greater environmental responsibility.

Railway Modernisation Boosts Casting Demand

India's ongoing railway modernisation programme continues to create significant opportunities for the domestic foundry industry. Rising investments in rolling stock, freight corridors, metro rail systems and railway infrastructure are generating sustained demand for high-quality cast components used across multiple applications.

Foundries are supplying a wide range of products including brake components, axle housings, couplers, bogie parts, wheel-related castings, pump bodies and various engineering components required for locomotives and railway maintenance equipment. The continued expansion of metro rail networks across major cities is also supporting demand for precision castings manufactured to stringent quality standards.

Industry participants note that



railway projects typically require long production cycles and strict compliance with technical specifications. As a result, foundries supplying this sector have strengthened their process controls, inspection systems and metallurgical testing capabilities to meet the performance requirements of railway authorities and original equipment manufacturers.

Growing localisation under government initiatives is further encouraging domestic sourcing of railway components. Indian foundries

with established quality systems and engineering expertise are increasingly participating in projects that were previously dependent on imported castings.

Several manufacturers have also expanded machining and finishing capabilities to supply ready-to-assemble components, allowing railway equipment manufacturers to reduce production lead times and simplify procurement processes.

Industry experts expect railway infrastructure investment to remain a stable source of demand for the foundry sector over the coming years. Continued development of dedicated freight corridors, station modernisation projects and expansion of passenger rolling stock is likely to create additional business opportunities for foundries serving the transportation sector.

Metallurgical Testing Enhances Foundry Performance

Metallurgical testing is becoming increasingly important within India's foundry industry as manufacturers seek to improve casting quality, minimise defects and satisfy increasingly demanding customer specifications. Growing expectations from automotive, aerospace, defence, power equipment and engineering sectors are encouraging foundries to strengthen laboratory capabilities and adopt more rigorous inspection procedures.

Modern foundries are investing in sophisticated testing equipment capable of analysing both raw materials and finished castings. Optical emission spectrometers, universal testing machines, hardness testers, metallographic microscopes and ultrasonic testing equipment are becoming standard features in many quality-focused facilities.

Routine metallurgical analysis enables manufacturers to monitor chemical composition, mechanical properties and microstructural characteristics before products reach



customers. Early identification of process deviations allows corrective action during production, reducing scrap generation and improving consistency.

Industry experts emphasise that laboratory testing has evolved from a final inspection activity into an integral part of process control. Regular monitoring of molten metal chemistry, inoculation practices and heat treatment performance helps foundries achieve repeatable production results while maintaining compliance with customer specifications.

The increasing production of safety-critical castings for automotive, railway, defence and industrial applications has further strengthened the importance of

reliable testing procedures.

Manufacturers are also introducing digital record-keeping systems that improve traceability and simplify quality audits conducted by customers and certification agencies.

Many medium-sized foundries are upgrading laboratory infrastructure to compete for higher-value engineering projects where documentation and testing play a decisive role during supplier selection. Industry associations believe these investments are helping Indian manufacturers improve product reliability while expanding participation in international supply chains.

As casting applications continue to become more sophisticated, metallurgical testing will remain a key element in strengthening India's foundry industry. Continuous improvements in laboratory capabilities are expected to support better product quality, stronger customer confidence and enhanced global competitiveness throughout the remainder of 2026.

Casting Design Collaboration Reduces Production Delays



Indian foundries are placing greater emphasis on early collaboration with customers during the product design stage, helping reduce production delays, improve casting quality and shorten development cycles. As engineering components become increasingly complex, manufacturers are recognising that design optimisation plays a critical role in successful

casting production.

Traditionally, foundries became involved only after component designs were finalized. However, many manufacturers are now working closely with customers from the initial design phase to evaluate casting feasibility, material selection and production requirements before tooling is developed.

This collaborative approach allows engineers to recommend design modifications that improve metal flow, reduce the likelihood of shrinkage defects and simplify moulding operations without affecting the functional performance of the component. Such improvements often reduce production costs while enhancing casting reliability.

Foundries serving automotive, pumps, valves, power equipment and heavy engineering sectors report that early design discussions help minimize costly tooling modifications and reduce the number of development trials required before commercial production begins.

Advanced casting simulation software and three-dimensional modelling tools are supporting these collaborative efforts by allowing engineers to analyse filling behaviour, solidification patterns and potential defect locations before manufacturing starts. Although simulation technology continues to evolve, the emphasis remains on combining digital analysis with practical foundry experience.

Machining Investments Create Value-Added Foundries



Indian foundries are increasingly expanding beyond conventional casting operations by investing in machining and finishing capabilities that enable them to supply complete engineering solutions. Growing customer demand for ready-to-install components is encouraging manufacturers to strengthen their downstream operations and capture greater value across the production chain.

Instead of supplying rough castings for further processing, many foundries are installing CNC machining centres, drilling machines, grinding equipment and precision finishing systems to deliver fully machined products. This

integrated manufacturing approach reduces lead times, improves quality control and simplifies procurement for customers.

The trend is particularly evident in sectors such as automotive, railways, pumps, valves, construction equipment and industrial machinery, where dimensional accuracy and component reliability are critical. Manufacturers increasingly prefer suppliers capable of delivering finished castings that require minimal additional processing before assembly.

To support this transition, foundries are also investing in advanced inspection technologies, including coordinate measuring machines (CMMs), balancing equipment and non-destructive testing systems. Enhanced quality assurance strengthens customer confidence while helping manufacturers comply with stringent domestic and international specifications.

Industry observers believe value-added manufacturing also improves

profitability by reducing dependence on third-party machining vendors and allowing foundries to participate in higher-margin projects. Many export-oriented companies are particularly focusing on integrated production capabilities to meet the expectations of overseas buyers seeking complete manufacturing solutions.

As India's engineering exports continue to expand, foundries offering machining, inspection and finishing services are gaining a significant competitive advantage. The ability to provide complete, precision-engineered components strengthens long-term customer relationships while opening opportunities in more technically demanding industries.

With manufacturing becoming increasingly quality-driven and customer expectations continuing to evolve, investments in machining infrastructure are expected to remain a key growth strategy for India's foundry sector during the coming years. ■

Energy Management Becomes a Strategic Priority

Rising energy costs and increasing emphasis on operational efficiency are encouraging Indian foundries to adopt more structured energy management practices. With melting operations accounting for a significant share of production costs, manufacturers are looking beyond equipment upgrades and focusing on process optimization to improve overall energy performance.

Foundries across the country are reviewing furnace utilization, production scheduling and maintenance practices to minimize energy losses during melting and holding operations. Better planning of production batches, reduced idle time and improved charge preparation are helping manufacturers optimize fuel



and electricity consumption without compromising output quality.

Industry experts note that induction furnace performance can be significantly improved through regular maintenance, optimized refractory lining and proper charge mix management. Many foundries are also paying greater attention to power quality and load management to reduce operational disruptions and improve equipment life.

In addition to melting operations, auxiliary systems such as compressed air networks, cooling systems and material handling equipment are being monitored more closely to identify opportunities for energy savings. Several medium-sized foundries have introduced routine energy audits to evaluate consumption patterns and implement corrective measures where required.

The growing use of energy monitoring instruments is enabling production teams to track electricity consumption at various stages of the manufacturing process. The availability of real-time operational data allows managers to identify inefficiencies quickly and make informed decisions regarding production planning. ■



Performance of Base Metals on July 2026



**Metalworld
Research Team**

The global base-metals market continued its resilient performance during June 2026, extending the steady recovery witnessed throughout the first half of the year. While macroeconomic uncertainties and geopolitical developments continued to influence investor sentiment, underlying industrial demand remained firm, enabling most base metals to maintain positive momentum across international and domestic exchanges.

Infrastructure investment, renewable-energy deployment, electric vehicle production, and grid-modernisation projects remained the principal demand drivers during the month. China's manufacturing sector continued to operate at stable utilisation levels, while industrial production across several Asian economies remained healthy. In India, robust activity across infrastructure, engineering, construction, and power sectors supported sustained consumption of copper, aluminium and zinc.

Global logistics also showed gradual improvement compared to

earlier months, although freight costs remained above long-term averages due to continued uncertainty across major shipping routes. Energy prices remained relatively firm, particularly impacting energy-intensive aluminium production. Nevertheless, the market demonstrated greater resilience to external disruptions than during previous years, reflecting stronger supply-chain adaptation and disciplined production planning.

Overall, June reinforced the industry's transition towards a fundamentally driven market, where long-term industrial demand continues to outweigh short-term speculative influences.

- LME (London Metal Exchange): Price Changes

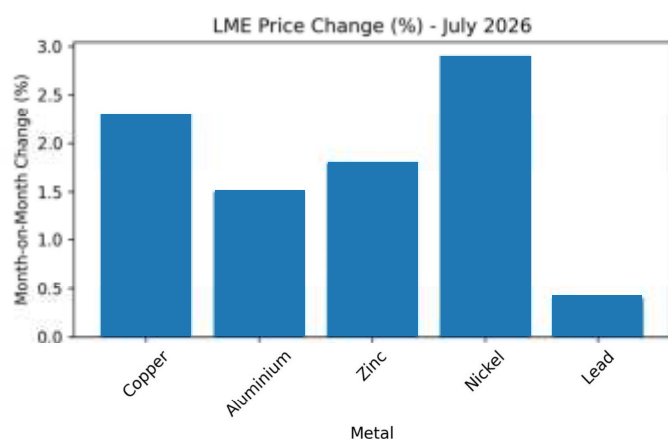
LME prices remained broadly positive during June as industrial demand continued to support market fundamentals while inventories remained relatively contained.

June 2026 Performance (Month-on-Month % Change):

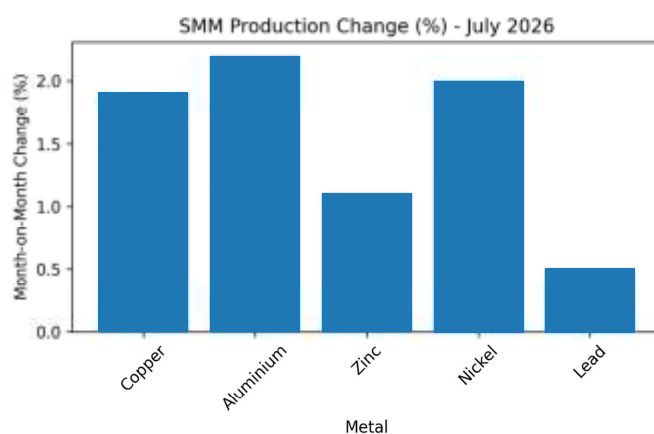
- Copper: +2.3% – Copper continued to strengthen on sustained investment in power infrastructure, renewable energy installations, and expanding electric vehicle production. Relatively low exchange inventories also supported prices.

- Aluminium: +1.5% – Aluminium prices remained firm as energy costs continued to influence production economics while downstream demand from transport, packaging and construction sectors remained healthy.

- Zinc: +1.8% – Zinc maintained positive momentum, supported by steady galvanizing demand and continued discipline in global concentrate supply.



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



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

- **Nickel:** +2.9% – Nickel remained the strongest performer among base metals, driven by battery-material demand and resilient stainless-steel production across Asia.

- **Lead:** +0.4% – Lead traded within a narrow range as replacement battery demand offset relatively comfortable inventory levels.

LME trading during June reflected continued confidence in industrial metals despite ongoing macroeconomic uncertainty.

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

China's metals industry continued to demonstrate stable production growth during June, supported by consistent industrial demand and improved operating efficiencies across major smelting facilities.

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

- **Aluminium Output:** +2.2% – Aluminium smelters maintained high utilisation levels due to stable power availability and improving downstream demand.

- **Copper Cathode Output:** +1.9% – Copper refinery utilisation improved

further as electrical equipment manufacturers and infrastructure projects maintained healthy order books.

- **Zinc Output:** +1.1% – Zinc production increased steadily as concentrate availability improved and operational disruptions remained limited.

- **Lead Output:** +0.5% – Recycled lead production remained stable with balanced domestic demand supporting output.

- **Nickel Output:** +2.0% – Nickel pig iron and matte production continued expanding in response to strong demand from EV battery manufacturers and stainless-steel producers.

Overall, Chinese production trends continued to support global supply without creating significant oversupply concerns, maintaining a balanced market environment.

- MCX (Multi-Commodity Exchange): India Futures

MCX reflected continued optimism within India's industrial sector during June, supported by healthy infrastructure execution,

manufacturing growth, and sustained participation from industrial hedgers.

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

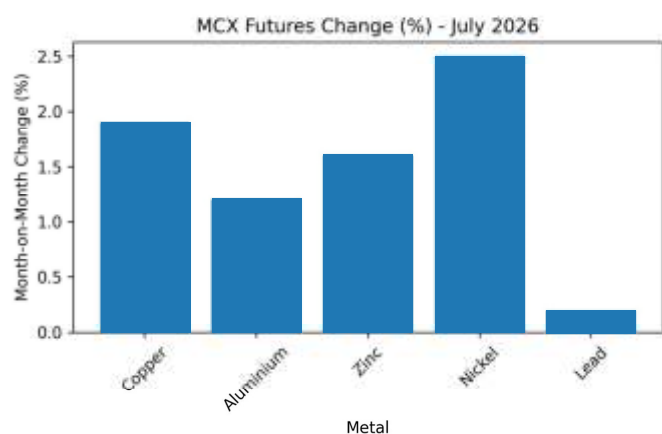
- **Copper Futures:** +1.9% – Copper futures benefited from continued investment in power transmission, renewable energy, railway electrification and cable manufacturing.

- **Aluminium Futures:** +1.2% – Aluminium maintained gradual gains as domestic demand remained firm across engineering, transportation and packaging industries.

- **Zinc Futures:** +1.6% – Zinc continued to benefit from strong galvanizing demand associated with infrastructure and construction activity.

- **Lead Futures:** +0.2% – Lead futures remained largely stable, reflecting balanced domestic market fundamentals.

- **Nickel Futures:** +2.5% – Nickel once again emerged as the best-performing contract on MCX, supported by sustained demand from stainless-steel producers and positive global market sentiment.



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

SIDE BY SIDE COMPARATIVE SNAPSHOT – JUNE 2026

(All numbers represent Month-on-Month % change; indicative data)

Metal	LME Price Change	SMM Output Change	MCX Future Change
Copper	+2.3%	+1.9%	+1.9%
Aluminium	+1.5%	+2.2%	+1.2%
Zinc	+1.8%	+1.1%	+1.6%
Nickel	+2.9%	+2.0%	+2.5%
Lead	+0.4%	+0.5%	+0.2%

Trading volumes remained healthy throughout June, with increasing participation from foundries, engineering companies, cable manufacturers and infrastructure-related industries.

Conclusion: Entering the Second Half of 2026 with Strong Fundamentals

The performance of base metals during June 2026 reinforces the industry's continued transition toward a market driven primarily by long-term industrial fundamentals rather than short-term speculation. The first half of 2026 has demonstrated remarkable resilience despite persistent macroeconomic uncertainties, reflecting the strength of global investment in infrastructure, renewable energy and advanced manufacturing.

Copper and nickel continue to establish themselves as the primary growth metals of the current industrial cycle. Increasing investment in power transmission, electric mobility, battery manufacturing and digital infrastructure is expected to provide sustained demand support throughout

the remainder of the year. Aluminium also remains well positioned, although developments in global energy markets will continue to influence production costs and supply dynamics. Zinc is expected to benefit from steady construction and galvanizing demand, while lead is likely to maintain relatively stable pricing under balanced market conditions.

Looking ahead, several developments are expected to shape the market during the second half of 2026:

- Continued infrastructure investment across India, China and Southeast Asia.

- Expansion of renewable-energy projects and power-grid modernisation.
- Growth in global EV production and battery manufacturing capacity.
- Energy-price movements and their impact on smelter profitability.
- Exchange inventory trends and concentrate availability.
- Shipping costs, logistics efficiency and supply-chain resilience.
- Macroeconomic policy decisions affecting manufacturing and industrial investment.

While geopolitical developments-including ongoing tensions in parts of the Middle East-continue to influence commodity markets through energy prices and freight costs, their impact on physical base-metal demand has remained limited. Instead, industrial consumption and long-term investment continue to provide the dominant direction for market performance.

As the industry enters the second half of 2026, the outlook remains cautiously optimistic. Stable production, disciplined supply growth and sustained demand from electrification, infrastructure and advanced manufacturing are expected to underpin the market. If these structural drivers remain intact, the base-metals sector is well positioned to maintain steady momentum through the remainder of the year.

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 June 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 transparency.



Auto Industry Sales Performance of June 2026 and Q1 (April–June 2026)

Rajesh Menon,
Director General,
SIAM

Key Highlights from Q1 (April–June 2026)

a) Passenger vehicles

- Passenger Vehicles posted its highest ever sales of Q1, in FY 2026-27, with 1.27 million units, with 25.9% growth over Q1 of FY 2025-26.

- The share of Utility Vehicles (UVs) in the Passenger Vehicle segment has now grown to about 68%, with UVs posting a growth of 28.6%, followed by passenger Cars with 21.3% in Q1 of 2026-27, over Q1 of 2025-26.

- Passenger Vehicles saw their highest ever exports in Q1 of 2026-27 of 2.22 Lakh units registering a growth of 8.8% over Q1 of 2025-26. Export growth in this segment was driven by good demand from Latin America though there is an impact on exports to Middle East. Rising demand from Europe & Japan has also contributed to the overall uptick.

b) Two-Wheelers

- The Two-Wheeler segment posted sales of 5.63 million units in Q1 of 2026-27, posting a growth of 20.3%, compared to the same period of last year.

- The growth in the scooter segment was higher compared to Motorcycles in TwoWheelers in Q1 FY2026-27 and the segment continued with the momentum created due to reduced GST.

- Highest Q1 exports of Two-Wheelers was recorded in this quarter with 1.55 million units, with a considerable growth of 36.6%, compared to Q1 of 2025-26. Demand in South Asia and Africa have been steady, while growth has been driven by markets in Latin America. c) Three Wheelers

- In Q1 of 2026-27, Three-Wheelers posted its highest ever Q1 sales with 2.14 Lakh units, along with a significant growth of 29.7%, compared to Q1 of 2025-26, driven by good growth in both Passenger Carriers and Goods Carriers.

- Increased economic activity and easier financing options are creating urban demand.

- 1.51 Lakh units of Three-Wheeler were exported, which is the highest ever in Q1, with a strong growth of 57.7%, as compared to last year's Q1.

d) Commercial Vehicles

- In Q1 of 2026-27, Commercial Vehicles also posted its highest ever sales with 2.65 Lakh units posting a decent growth of 18.3% compared to Q1 of last year.

- Within the Commercial Vehicle segment, the Passenger vehicle segment posted marginal growth, while



the Goods segment posted double digit growth backed by continued replacement demand and demand from the mining and cement sector.

- Exports of Commercial Vehicles posted a growth of 43.3% in Q1 of 2026-27, compared to Q1 of previous year, with exports of around 0.28 Lakh units, which is also the highest ever exports in any Q1, due to recent demand of Pick-ups in Southeast Asia. Growth Outlook for Q2 (July – Sept 2026)

- Overall, the vehicle cost has remained lower due to GST 2.0 impact, along with availability of financing at lower rates, which are continuing to drive demand.

- Rainfall in late June and first week of July has reduced the monsoon deficiency to some extent till date. Inflation has also been reasonable and has not impacted the demand in Q1.

- As the industry gets into the festive season, it is expected that the steady demand should continue.

- However, commodity costs continue to remain a pressure point for the industry,

- While the earlier ceasefire in West Asia eased the supply of gas, fuels and other commodities, industry continues to closely monitor the very recent developments.

Monthly Performance: June 2026

Production:

The total production of Passenger Vehicles¹, Three Wheelers, Two Wheelers and Quadricycle in the month of June 2026 was 30,15,528 units

Domestic Sales:

- Passenger Vehicles² sales were 3,88,144 units in June 2026.

- Three-wheeler sales were 77,951 units in June 2026.

- Two-wheeler sales were 18,51,400 units in June 2026.

¹BMW, Mercedes, JLR, Tata Motors & Volvo Auto data are not available.

²BMW, Mercedes, JLR & Volvo Auto data are not available. Tata Motors Domestic Sales data for June included only in this document.

DOMESTIC SALES

Category	Domestic Sales (In Nos.)		
	June		
	2025	2026	% Change
Total Passenger Vehicles²	3,12,851	3,88,144	24.1%
Three Wheelers			
Passenger Carrier	51,350	64,181	25.0%
Goods Carrier	9,141	11,828	29.4%
E-Rickshaw	1,043	1,590	52.4%
E-Cart	294	352	19.7%
Total Three Wheelers	61,828	77,951	26.1%
Two Wheelers			
Scooters	5,35,307	7,44,823	39.1%
Motorcycles	9,92,627	10,56,422	6.4%
Mopeds	33,349	50,155	50.4%
Total Two Wheelers	15,61,283	18,51,400	18.6%
Quadricycle	-	-	-

² BMW, Mercedes, JLR & Volvo Auto data are not available, Tata Motors Domestic Sales data for June included only in 'Total PV'; detailed break-up is not available. However, without Tata Motors, 'Total PV' would be 2,75,768 units for June 2025 and 3,26,068 units for June 2026

DOMESTIC SALES : Q1 - April - June 2026

Category	Domestic Sales (In Nos.)		
	April - June		
	2025	2026	% Change
Total Passenger Vehicles³			
Passenger Cars	3,03,129	3,67,549	21.3%
Utility Vehicles	6,70,120	8,61,918	28.6%
Vans	38,635	44,344	14.8%
Total Passenger Vehicles	10,11,884	12,73,811	25.9%
Commercial Vehicles⁴			
M&HCVs			
Passenger Carrier	18,522	17,539	-5.3%
Goods Carrier	65,518	78,371	19.6%
Total M&HCVs	84,040	95,910	14.1%
LCVs			
Passenger Carrier	16,949	19,084	12.6%
Goods Carrier	1,22,871	1,49,837	21.9%
Total LCVs	1,39,820	1,68,921	20.8%
Total Commercial Vehicles	2,23,860	2,64,831	18.3%
Three Wheelers			
Passenger Carrier	1,35,871	1,74,485	28.4%
Goods Carrier	25,996	35,436	36.3%
E-Rickshaw	2,593	3,318	28.0%
E-Cart	751	1,100	46.5%
Total Three Wheelers	1,65,211	2,14,339	29.7%
Two Wheelers			
Scooters	16,65,180	21,78,858	30.8%
Motorcycles	29,03,449	33,08,847	14.0%
Mopeds	1,09,361	1,40,970	28.9%
Total Two Wheelers	46,77,990	56,28,675	20.3%
Quadricycle	4	-	-
Grand Total	60,78,949	73,81,656	21.4%

³BMW, Mercedes, JLR & Volvo Auto data are not available. ⁴Daimler data is not available.

Quarterly Performance: Q1-April - June 2026

Production:

Total production of Passenger Vehicles³, Commercial Vehicles⁴, Three Wheelers, Two Wheelers and Quadricycle in April - June 2026 was 93,60,297 units.

Domestic Sales:

- Passenger Vehicles³ sales

were 12,73,811 units in April – June 2026.

- Commercial Vehicles⁴ sales were 2,64,831 units in April – June 2026.

- Three-wheeler sales were 2,14,339 units in April – June 2026.

- Two-wheeler sales were 56,28,675 units in April – June 2026.

³BMW, Mercedes, JLR & Volvo Auto

data are not available.

⁴Daimler data is not available.

Commenting on sales data of Q1 of 2026-27, Mr Shailesh Chandra, President, SIAM said, "Passenger Vehicles, Commercial Vehicles and Three-Wheelers posted their highest-ever Q1 sales, while all vehicle segments, including Two-Wheelers, recorded their highest-ever exports during the quarter. The strong performance across segments in Q1 of 2026-27, despite headwinds arising from disruptions in West Asia, can be attributed to supportive domestic demand, aided by lower GST rates, softer financing costs, low base effect and introduction of new models. While overall consumer sentiment and demand remain steady at present, the industry continues to closely monitor geopolitical developments and the progress of the monsoon, given its implications for agricultural output and rural demand."

Commenting on the performance of Q1 of 2026-27, Mr Rajesh Menon, Director General, SIAM said, "High double-digit growth was recorded across all vehicle segments in Q1 of 202627, compared to the corresponding quarter of the previous financial year. Passenger Vehicle sales reached 1.27 million units, registering a robust 25.9% growth over Q1 of 2025-26.

ThreeWheeler sales grew by 29.7% to 2.14 lakh units, while Two-Wheeler sales increased by 20.3% to 5.63 million units. Commercial Vehicle sales also posted a healthy 18.3% growth, reaching 2.65 lakh units during the quarter compared to the same period last year."

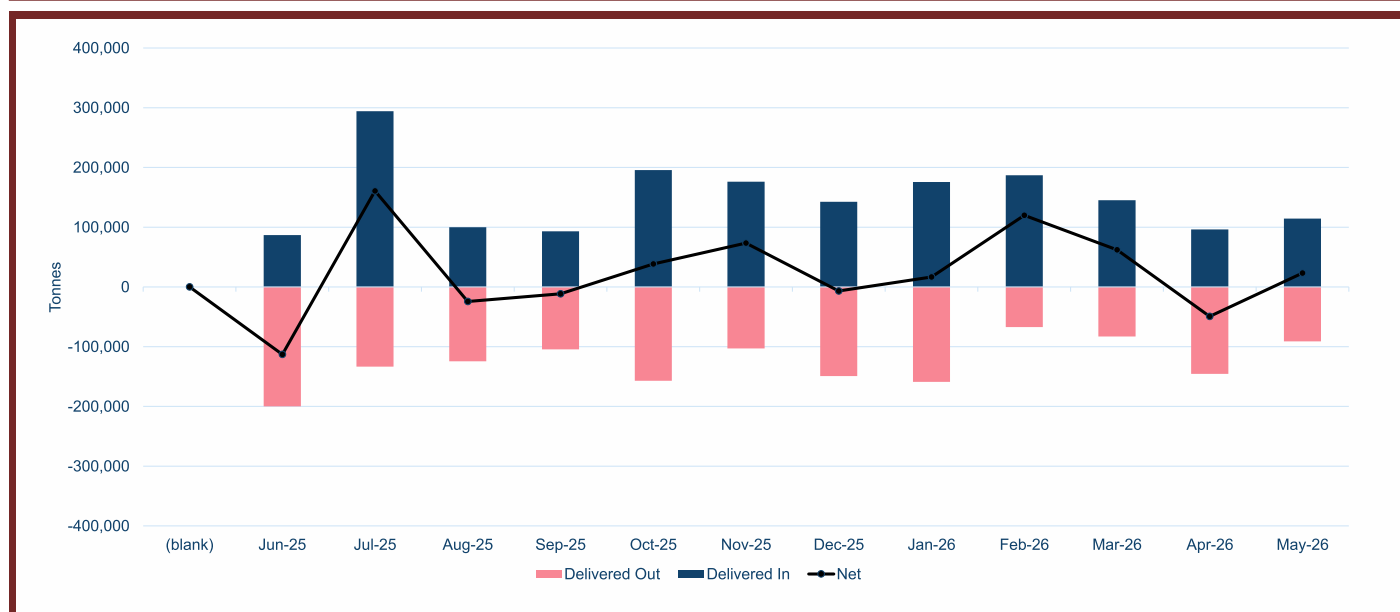
BASE METALS WATCH

London Metal Exchange Prices - June 2026

Contract	OFFICIAL CASH SETTLEMENT PRICE				OFFICIAL 3 MONTH PRICE			
	Average	Low	High	*M/M Change %	Average	Low	High	*M/M Change %
LME Aluminium	\$3,458.64	\$3,105.50	\$3,855.00	-5.8%	\$3,438.89	\$3,112.00	\$3,752.50	-4.5%
LME Aluminium Alloy	\$3,487.95	\$3,325.00	\$3,510.00	7.9%	\$3,487.95	\$3,325.00	\$3,510.00	7.9%
NASAAC LME NASAAC	\$2,700.00	\$2,650.00	\$2,750.00	5.7%	\$2,700.00	\$2,650.00	\$2,750.00	5.7%
LME Copper	\$13,574.32	\$13,181.50	\$13,966.00	0.5%	\$13,616.73	\$13,235.00	\$13,975.00	0.4%
LME Lead	\$1,951.25	\$1,845.00	\$2,035.00	-2.0%	\$1,969.30	\$1,885.00	\$2,035.00	-1.0%
LME Nickel	\$17,663.86	\$16,275.00	\$19,170.00	-6.1%	\$17,856.36	\$16,405.00	\$19,350.00	-6.1%
LME Tin	\$53,357.50	\$49,550.00	\$57,525.00	-0.6%	\$53,601.59	\$50,100.00	\$57,775.00	-0.3%
LME Zinc	\$3,540.50	\$3,432.00	\$3,624.50	1.5%	\$3,547.91	\$3,425.00	\$3,639.50	1.4%
LME Cobalt	\$55,854.32	\$55,845.00	\$55,870.00	0.0%	\$56,290.00	\$56,290.00	\$56,290.00	0.0%

Source : LME

Monthly Warehouse Stock Movements - LME



Source : LME

Multi Commodity Exchange Prices - June 2026

	HIGH	LOW	OPEN	CLOSE	%CHANGE
ALUMINIUM	340.80	338.25	339.25	342.30	-1.14
COPPER	1320.20	1311.50	1319.65	1324.40	-0.77
ZINC	383.75	381.20	383.60	384.70	-0.66
LEAD	197.35	197.05	197.35	198.20	-0.45
NICKEL	1661.00	1645.00	1661.00	1657.10	-0.66

Source : MCX

INDIAN AUTOMOBILE MONITOR

June 2026

Numbers of Vehicles

	PRODUCTION		DOMESTIC SALES		EXPORTS	
	JUNE		JUNE		JUNE	
	2025	2026	2025	2026	2025	2026
I. PASSENGER VEHICLES (PVS)						
PASSENGER CARS	1,01,882	1,25,819	85,229	98,610	41,371	31,005
UTILITY VEHICLES	2,17,572	2,49,950	1,81,199	2,17,228	34,051	45,154
VANS	9,151	10,698	9,340	10,230	1,297	442
TOTAL PASSENGER VEHICLES (PVS)	3,28,605	3,86,467	2,75,768	3,26,068	76,719	76,601
II. COMMERCIAL VEHICLES (CVS)						
M&HCVS						
PASSENGER CARRIER	22,799	19,968	18,522	17,539	3,173	2,094
GOODS CARRIER	77,367	86,518	65,518	78,371	3,268	4,628
TOTAL M&HCVS	1,00,166	1,06,486	84,040	95,910	6,441	6,722
LIGHT COMMERCIAL VEHICLES (LCVS)						
PASSENGER CARRIER	18,068	18,901	16,949	19,084	926	677
GOODS CARRIER	1,39,790	1,71,756	1,22,871	1,49,837	12,062	20,440
TOTAL LCVs	1,57, 858	1,90,657	1,39,820	1,68,921	12,988	21,117
TOTAL COMMERCIAL VEHICLES	2,58,024	2,97,143	2,23,860	2,64,831	19,429	27,839
III. THREE WHEELERS						
PASSENGER CARRIER	82,946	1,17,707	51,350	64,181	36,741	51,574
GOODS CARRIER	8,888	12,634	9,141	11,828	447	372
E-RICKSHAW	665	1,587	1,043	1,590	-	5
E-CART	77	268	294	352	-	2
TOTAL THREE WHEELERS	92,576	1,32,196	61,828	77,951	37,188	51,950
IV. TWO WHEELERS						
SCOOTERS	5,72,017	8,73,801	5,35,307	7,44,823	43,586	73,306
MOTORCYCLES	13,37,331	15,70,745	9,92,627	10,56,422	3,42,892	4,70,162
MOPEDS	35,372	51,398	33,349	50,155	1,284	216
TOTAL TWO WHEELERS	19,44,720	24,95,944	15,61,283	18,51,400	3,87,762	5,43,684
TOTAL QUADRICYCLE	357	921	-	-	462	870
GRAND TOTAL OF ALL CATEGORIES	27,24,448	34,19,157	22,06,779	26,,16,160	5,28,001	7,07,666

Source: SIAM

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