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D. A. Chandekar
Editor

Dear Readers,

Middle East & North Africa (MENA), the fastest growing region as far as infrastructure development is concerned, is a very prominent region for metals industry, especially for the aluminium. It has upstream facilities like refining and smelting so also the downstream processes like extrusion, rolling etc. The metals are the basic inputs for the infrastructure development and in MENA region also, the metals industry is trying to support its ever growing needs for infrastructure development process. The major trade partners of this region are China, Turkey, CIS countries etc. Though the logistics between this region and India is quite friendly, India is not able to push huge metal quantities there. Matching international prices and deliveries is always a challenge. On the geopolitical scene, all is not well in the Middle East. As we know, the Ukraine - Russia war is going on for more than two years and still there are no signs of ending it. Even though the war is being fought between only two countries, many other countries including the global big powers are indirectly involved in it. It has not only affected the metals exports from Ukraine and Russia into the middle east, but also the sea routes around those countries and the international trade. Further, the Israel - Hamas fight which erupted in October 2023, also has many dimensions. Many Middle East countries have been openly involved in the fight and this has directly impacted the infrastructure development process in the region.

Considering the importance of MENA region, for the last few years, 'Metalworld' is covering the industry developments, new projects etc. in MENA region and it is very well received by the industry. Also it is invited to most of the metallurgical trade shows in the region as Media Partner. This ensures its continued connect with the metals sector in the region. I feel this is the result and the reward for our adoption of digital platform which substantially enhanced 'Metalworld's industry penetration in the region and it's sustained presence in the region.

Today, the situation in the Middle East is quite fluid and it has naturally affected the metals industry in the region. We can only hope that the geopolitical situation surrounding MENA region improves and the infrastructure development process in the region continues smoothly. Also, we should look forward to more trade between India and the MENA region, which will bring these regional economies closer. Apart from supplying finished metals and metal products, India can supply plant equipment, technology, technically qualified manpower, top management personnel etc., not to forget the training and research facilities ! The infrastructure development of any region will depend on the metals and this is true for the MENA region as well ! ■

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STEEL & METAL EXPO
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'Future of Auto Industry in India'

The Asian Metallurgy Show, originally a physical exhibition since 1997, transitioned to a digital platform in 2021 due to Covid. The virtual Steel n Metal Expo held from 18th to 31st December, 2023, featured online stands and webinars covering topics like digitalization, commodity trading, green steel production, role of zinc, sustainability. A notable webinar titled 'Future of Auto Industry in India'.

The expert panel featured Sanjiv Mantri, Ex Chief Engineer and Consultant, (PVBU) Tata Motors Ltd Sanjay Nibandhe, Dean Innovation & Entrepreneur and C.H.Sharma, Steel Plant Consultant. This webinar was hosted by Mr. Udayan Pathak, Ex Head, World Class Quality, ERC Tata Motors.

Udayan Pathak - The Indian automotive industry is undergoing significant changes driven by both

Udayan Pathak
Ex Head, World Class Quality,
ERC Tata Motors.

government mandates and voluntary decisions.. Additionally, environmental commitments have led to tighter emission regulations, increasing the demand for steel and other metals in vehicles. These changes prompt a discussion on current and upcoming regulations in the automotive sector.

Sanjay Nibandhe
Dean Innovation & Entrepreneur

Sanjay Nibhande - As the automotive industry expands in India, understanding safety regulations like BN Cap becomes crucial. These regulations aim to protect occupants and pedestrians in accidents. Alongside seat belt enforcement, newer regulations focus on minimizing injuries and enhancing vehicle safety in various collision scenarios like frontal, side, and rear impacts. Vehicle construction now emphasizes energy absorption and protection devices like airbags to mitigate risks and reduce occupant injuries. OEMs face challenges in meeting safety standards while ensuring minimal deformation and injury to occupants. Further discussion on these topics will aid in advancing safety measures in the automotive sector.

Sanjiv Mantri
Ex Chief Engineer and Consultant,
(PVBU) Tata Motors Ltd

Sanjiv Mantri - Ensuring safety in vehicles involves complex engineering to withstand various crash scenarios. From seat belts to airbags, each component must respond within milliseconds to minimize injury. Materials like

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steel must absorb energy efficiently during impacts while maintaining structural integrity. Design considerations include crash member placement and deformation patterns. As vehicle features increase and weight becomes a concern for fuel efficiency, engineers face challenges in balancing safety, weight reduction, and customer demands.

Udayan Pathak - The challenges faced by the automotive industry, such as meeting safety standards while reducing weight for fuel efficiency, have created opportunities for the steel industry, especially in producing special steels. These contradictory requirements present opportunities for steel mills and special steel manufacturers to support OEMs in meeting regulatory standards. Both the Indian and global automotive industries are evolving to address these demands, and the steel industry plays a crucial role in providing solutions to meet legal and regulatory frameworks while ensuring vehicle safety and performance.

C.H.Sharma - Over the past five decades in the steel industry, I've witnessed a significant shift towards quality consciousness, both in manufacturing and usage. In the mid-eighties, advancements in refining processes led to a realization of the stringent requirements set by international standards,

C.H.Sharma
Steel Plant Consultant

particularly those from Japan. Over the last 20 years, the steel industry has successfully met these challenges, gaining approval from global automotive companies for their high-quality steel products. Currently, there are around 12 to 14 players in the steel industry capable of manufacturing top-notch products, with others rapidly catching up. Meeting demands for high-strength and specialized steel requires meticulous control over trace elements, gases, and ingredients, which the industry now excels at. With dedicated R&D and technical expertise, steelmakers can fulfill the evolving needs of the automotive sector, ensuring a steady supply of quality steel for various applications.

Sanjay Nibandhe - Last month, in 2023, Indian auto sales totaled around 800,000 vehicles, significantly lower than the US sales of 4.8 million vehicles. Passenger car sales exceeded 64,000 units. The shift towards zero-emission vehicles is gaining momentum, with Europe aiming for zero emissions by 2030 and India likely targeting 2040 or 2050. Safety concerns regarding vehicle fires, particularly in scooters and cars, highlight the need for stringent regulations. Issues such as outdated electrical systems and inadequate insulation in cables must be addressed, along with crash safety norms and battery mounting procedures. Startups entering the market must meet these safety standards. The disposal of lithium batteries poses environmental risks, emphasizing the importance of end-of-life management. Regulatory measures aim to ensure the safety and reliability of vehicles on the road.

Udayan Pathak - As the automotive industry transitions towards more electronic

control systems, there is a growing need for materials that can mitigate these risks, such as fire-resistant steels and coatings that attenuate electromagnetic voltage. This presents an opportunity for the steel industry to innovate and provide solutions to enhance the safety and reliability of electric vehicles.

Sanjiv Mantri - The discussion delves into the multifaceted challenges and considerations surrounding electric vehicles (EVs), particularly regarding battery safety, structural integrity, and material requirements. Protecting the battery, akin to safeguarding the heart of a vehicle, involves innovative solutions like using the battery

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as a structural element and reinforcing the vehicle body with lightweight yet strong materials. However, the transition to EVs presents conflicting demands: the need for lightweight structures clashes with the requirement for high-strength materials to meet crash safety standards. Manufacturing challenges arise in shaping and joining these advanced materials. Additionally, advancements in vehicle safety, including child occupant protection and the integration of multiple airbags, introduce further complexities in design and packaging. These challenges underscore the intricate balance between technological innovation, safety, and material science in the automotive industry's transition to electric mobility.

C.H.Sharma- The penetration of electric vehicles (EVs) in the market has been slower than anticipated, with only around 5.5% of four-wheelers being EVs. However, the overall volume of steel usage is still increasing, driven by other industries like agriculture machinery. The challenge lies in adapting to high-strength steel requirements, particularly in welding applications. Specialized welding electrodes could be developed to address this need. Additionally, concerns arise regarding the lengthy charging times of EV batteries, which can take up to 7-8 hours. This may hinder the popularity of EVs due to the inconvenience compared to quick refueling times for traditional vehicles..

C.H.Sharma - Special steel industries are actively working to reduce pollution by transitioning to solar and electric power. Many plants are signing agreements for renewable energy, leading to significant cost savings and environmental benefits. For instance, one plant has secured 110 million units of solar power, saving up to 4% of production costs. This trend is spreading, with other

plants also adopting solar power, resulting in substantial emissions reductions. Additionally, there's a gradual shift towards more sustainable technologies, such as moving from blast furnaces to arc furnaces, further contributing to pollution control efforts.

C.H.Sharma - Currently, steel plants with electric arc furnaces (EAF) are operating at reduced capacity due to narrow profit margins. Cost reduction of Rs. 5000 from various sources could potentially allow them to operate at full capacity. However, plants using blast furnace route have a cost advantage due to cheaper hot metal. Despite this, pollution concerns and government scrapping policies may impact their operations in the long run. Additionally, the scarcity of scrap due to export restrictions imposed by 60 countries further complicates the situation for EAF plants.

Udayan Pathak - The government's vehicle scrappage policy is expected to generate around 3.5 million tons of steel scrap and 0.2 million tons of aluminum scrap annually for the next three years. This indigenous scrap will significantly reduce the need for importing scrap, which costs approximately $10 million annually. With local scrap availability increasing, costs of steel and aluminum production are expected to decrease, providing substantial savings.

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Feature

Women's Day 2024 at Vedanta Aluminium

Ahead of International Women's Day 2024, Vedanta Aluminium, India's largest producer of aluminium, has launched #TheFutureOfMetAL, acompellingsocial media campaign on women in metals & mining. It leverages generative AI and short films to encourage more women to explore rewarding careers in these industries.The campaign comes as a response to industry efforts to increase female representation in the sectors, which has progressed slowlylargely due to entrenched biases and a lack of suitable role models.

The #TheFutureOfMetALcampaign creatively tackles this challenge in twoways. Firstly, it positions the overall industry as an attractive destination for early-career women professionals.Secondly, it also presents a'slice of life'glimpse of those already managing core operations at Vedanta Aluminium, highlighting strong role models from the company's own employees to help more women visualise what a career in the industrywould look like. Through these campaigns, Vedanta Aluminium aims toaccelerate towards its goal of having women comprise at least a third of all its employees in the near future.

The first part of the campaign, titled '*Women of Mettle*', presents a series of short filmsfeaturing young women professionals performing crucial roles at Vedanta Aluminium.

Uniquely in India, they are going a step further by working in the night shift, on an equal footing with male colleagues. The second part, titled '*The Future Female Series*', features women professionals from core functions at the company, such as mine operations, metal production, power generation, plant management, and asset security. Using Generative AI technology, it depicts these employees transitioning from their current settings to a technologically advanced future, representing how these careers will remain aspirational even in the times ahead.

The narratives presented in the campaign are significant as women continue to be grossly underrepresented in themetals, mining and manufacturing sectors.These industries areexpected togrow exponentiallyowing to India's rapid economic progress andthe accelerating energy transition globally, which calls for a metal-intensive future.Vedanta Aluminiumis also activelyexpanding its operations to cater to thisgrowing demand.Itwillresult in an explosion of new career pathwaysin these sectors.However, they face a widening talent gap, led by misconceptionsthat jobs in theseareasnecessitate physically intensive labour, which has in fact been negated with the introduction of technologies such as robotics and automation as well as improved processes.

In this context, #TheFutureofMetALpresents a more accurate picture of the manufacturing sector.Vedanta Aluminium already has an industry-leading number of women employees, and aims to ensure that 50% of all new hires are women. Those already on its rolls arefitting role modelswho could inspire innumerable others to explore careers in manufacturing. The campaign is therefore a uniquely creative ode to the increasing participation of women in an essential and fast-growing industry, leveraging the encouragingexperiencesof its women professionals to advocate for greater gender representation.

Sharing his views, Mr. John Slaven, CEO, Vedanta Aluminium said, “At Vedanta Aluminium, we are building an environment primed for high performance and innovation. Boosting female participation inour teamsprovides us withinvaluable access to a wider spectrum of opinions and perspectives. This in turn provides for well-rounded decision-making, enables us to cater to diverse markets and ensures superior customer service. Addressing the gender gapdoesn't just make solid business sense, it also allows for equitable and sustainable growth.”

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Material Needs of the Changing World

(Part 2)

3.Major changes in material consumption over last four decades

Last four decades have observed major changes in material consumption on account of various reasons, mainly the long term drifts. These changes are influenced by various factors, including economic development, technological advancements, societal shifts, and environmental awareness. Here are some notable trends

3.1. Globalization of supply chains: The increased globalization of trade has led to the establishment of complex and extensive supply chains. This has allowed for the more efficient movement of materials and goods across borders, impacting consumption patterns.

3.2.Rapid industrialization of Asia: The last four decades have seen significant industrialization, particularly in Asia. Countries like China have experienced rapid economic growth and urbanization, leading to increased demand for raw materials and manufactured goods.

3.3.Technological Advances: Advances in technology have influenced material consumption in various industries. For example, the rise of digital technologies has reduced the need for physical media (such as CDs and DVDs), while the proliferation of smart phones and electronic devices has increased demand for rare earth metals.

3.4.Polymer / plastic availability, variety, Consumption and waste: The use of plastics has surged over the past few decades, contributing to environmental concerns.

Sadguru Kulkarni
Retired President - Technology, Hindalco Industries Ltd Corporate, covering Research and Technology, Technical. Now a Freelance Consultant in FMCG, Minerals & Metals, Chemicals and Sustainability

Single-use plastics, in particular, have become a major focus of attention due to their environmental impact, leading to efforts to reduce plastic consumption and improve recycling.

3.5.Increased focus on climate change & sustainability: Environmental awareness has grown, leading to changes in consumer behavior and corporate practices. Sustainable and eco-friendly products are becoming more popular, influencing the types of materials used in manufacturing.

3.6. e-Consumption & e-waste: The proliferation of electronic devices has led to increased consumption of electronic components and metals. However, it has also resulted in a surge in electronic waste (e-waste) concerns, prompting efforts to address responsible disposal and recycling

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3.7.Respurce scarcity, Alternatives, and resource-nationalization: Growing concerns about resource scarcity, particularly for critical minerals and rare earth elements, have prompted discussions about diversifying supply chains and exploring alternative materials.

The development of new materials and manufacturing processes can lead to changes in material consumption. Innovations in materials science, such as the use of advanced composites or bio-based materials, can offer alternatives to traditional resources. Evolution of packaging materials from metal to plastics, to fully biodegradable polymers to composites to reuse of bulk packages through on-site refill machines makes an interesting story that deserves a separate article (which will follow here).

3.8.Urbanization and

evolving construction materials: The rapid urbanization seen in many parts of the world has driven increased consumption of construction materials. This includes concrete, steel, and other resources used in building infrastructure and housing.

4. Renewable Energy as a trigger for changes in material consumption: Reasons for impetus in renewable energy have been many. It started back in 1970s with sharp increase in oil price, and formation of OPEC that affected the economics of manufacturing, as well as caused political turmoil. Climatic effects and global warming on account of sharp increase in GHGs and societal effects thereof lead to search for cost-effective alternatives- including solar, wind, bioenergy, wave energy, thermos-electric as well as others. This demanded the search for alternative materials-such as solar cells, epoxy resins, saline stable metals and polymers, energy storage devices, light-weighting, e-transportation etc, it also resulted in resource control by certain countries and political effect thereof; almost reminding the attempt by Nazi material scientists to make every organic chemical from coal, which they had as a resource. The transition to enhanced renewable energy sources can have several impacts on material consumption across various sectors. Here are some changes associated with the adoption and expansion of renewable energy technologies:

4.1. Increased demand for a new breed of metals:

The production of renewable energy technologies, such as solar panels and wind turbines, often requires specific metals and minerals. For instance, photovoltaic cells in solar panels use materials like silicon, silver, and rare earth elements. Wind turbines use materials such as steel, aluminum, copper, and rare earth magnets. The increased deployment of these technologies can drive demand for these materials.

4.2.Materials for Energy storage devices: As the share of renewable energy in the power grid grows, the need for energy storage technologies also increases. Batteries, capacitors, and other storage solutions become crucial for balancing intermittent renewable energy generation. The production of energy storage systems involves materials like lithium, cobalt, nickel, and other rare metals, impacting the demand for these resources.

4.3. Evolution of Grid and traditional infrastructure: Integrating renewable energy into the existing power grid often requires upgrades and changes in the grid infrastructure. Upgradation of old low voltage grids countries like India, to high voltage, over long distances has been leading to lower transmission losses, as well as better energy efficiency; justifying the economics of the spend. Upgrades for integration of conventional power with renewable power of different quality and temporal variation involves major spend on a new

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infrastructure. These involve materials such as steel, aluminum, copper, and conductive materials for power lines, transformers, and other components. The decline in the use of traditional fossil fuels may influence the construction and maintenance of infrastructure associated with conventional energy sources, such as coal and natural gas power plants. This could lead to changes in material consumption patterns in these sectors.

4.4. Reduced dependence on fossil fuel: A shift towards renewable energy reduces the dependence on traditional fossil fuel extraction and processing industries. While this doesn't eliminate the need for raw materials, it alters the types and quantities of materials required for energy production.

5. Which technologies are of key focus in generating new materials?

The need for newer materials or newer, sustainable processes to generate old materials is evident. Where will these materials come from? As Einstein said, 'if you follow the same road, it will take you to the same destination!' Here is an overview of technologies which are important in the search and evolution of new materials.

5.1. Artificial Intelligence: This involves application of new technologies like Material Informatics and Generative models. AI based Algorithms can analyze vast datasets of materials properties, structures, and performance to identify patterns and predict new materials with desired characteristics. Tools based on this technology are in their infancy. Databases like MaterialsProject.org, MaterialsWeb.orgHT software: Pymatgen, MPInterfaces and AI tools like Material -Atlas, Material-

Zones, Platform based on integration of industrial and biomaterials are already in their test versions. There are more fundamental models AI can be used to generate molecular structures and predict their properties, accelerating the design of new materials.

5.2. Additives Manufacturing: Nanotechnology allows bottoms up manufacturing via the manipulation of materials at the nanoscale, enabling the creation of new nanostructures with unique properties. The combination of different nanomaterials can result in hybrid materials with enhanced properties. Layer-by-layer fabrication allows for the creation of materials with varying properties throughout their structure.

Scale up of nano manufacturing to commercial is already on the way in areas like designed foods, functional textiles, electronics, biomedical etc and this may soon evolve into scales of conventional large scale manufacturing.

5.3. Computing & simulation of materials: Computational techniques, such as molecular dynamics, enable the simulation of material behavior at the atomic and molecular levels, aiding in the design of new materials. Development in advanced characterization techniques, imaging technologies and combinatorial processes support this modelling work, via rapid validation. Automated systems can rapidly test a large number of material compositions and conditions to identify optimal combinations. Robotic set ups enabled with advanced sensors will help directed synthesis of new materials predicted by the materials models.

5.4. Synthetic biology: While this area is in infancy, it offers a high potential for scaled up production. Using genetically modified organisms or synthetic biology techniques to produce novel biomaterials with specific properties. Designing and engineering proteins for specific functions, leading to the creation of bio-inspired materials

6.Which materials are likely to disappear or be phased out?

Appearance of new materials is often accompanied by disappearance of older, unsustainable or environmentally damaging

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materials. Case of materials such as wood, cotton, asbestos, CFC refrigerants support this. Based on the present understanding, the following materials will disappear soon- single use plastics, incandescent lighting, hard to recycle themosets, CFC refringent, hazard/toxicity causing chemicals, etc. New alternatives are already appearing to take their place.

We plan to continue the discussion with additional questions and prospective answers in the coming issues of Metalworld. So as to get insights into the 'Material Needs of the changing world'

Copper price soars as Chinese smelters explore production cut measures

Copper spiked to an 11-month high after Chinese smelters pledged to explore measures to cope with a plunge in processing fees, including possible production cuts that could leave buyers under-supplied.

Prices soared as much as 3.5% after executives from at least 15 Chinese plants discussed steps including potential production cuts in Beijing on Wednesday. The rally sparked one of the busiest days for electronic trading in years on the London Metal Exchange, and brought a months-long spell of range-bound trading to an abrupt halt.

Copper traded on Comex surged the most in 16 months, settling up 3.3% to $4.06 a pound.

Shares of copper miners also gained, with First Quantum Minerals Ltd. climbing 12%, Freeport-McMoran Inc. gaining more than 7%, and Antofagasta Plc and Glencore Plc adding about 5%.

"The timing of the next bull market in copper has been pulled forward due to a better demand outlook than we had previously envisioned," Jefferies analysts including Christopher Lafemina said in a note. "Obviously there are still risks, and we are not raising our near-term copper price forecasts yet, but our current deck is increasingly conservative."

Smelters in China, the world's top refined metal producer and consumer, are facing a crisis after so-called treatment and refining charges — the amount they're paid to convert concentrate into metal — collapsed. That's prompted talk of possible output cuts at smelters, which are highly dependent on imported raw materials.

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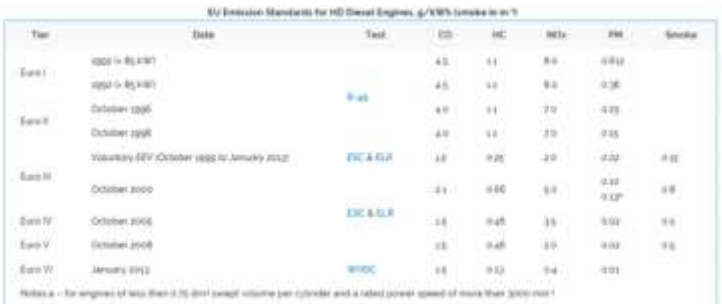
Coatings for Efficient and Clean Automotive Truck Production

(Part 1)

Trucks are an essential transport vehicle beside trains, ships and airplanes ensuring trade and the infrastructure of daily life. The demands on truck engines due to pollution regulations has been increasing and a lot has been already achieved in the last few decades. Below is the history of the European



This has led to much more complex castings, which foundries have to produce. To meetthis challenge, coatings are an integral and necessary part of the production process. The in-depth knowledge of foundry processes and the options for raising performance (costs down, productivity, flexibility and quality up) is key to success for foundries.

The correct selection and use of coatings are two of the levers to improve casting quality, productivity and protect the environment. The type of refractories can have profoundly different effects, such as the reduction of penetration or burn-in on hot spots, providing chemicals, which can absorb gases, such as SO_2 to prevent graphite degeneration, and oxidizing agents that reduce the reaction of the mold gasses with the melt. Anti-veining components can be used as well, which reduce the thermal stress onexposed locations.

The application of these types of coatings can provide a great saving potential in the fettling shop and in reducing scrap levels.

Fusion, or burn-in defects, and penetration, or burn-on defects, are still quite common in foundries, especially in some Asian countries, where the sand quality is poor. These defects can be found on automotive parts where hot spots are present, for example, in the delicate areas of water jackets or galleries. All of them lead to an enormous amount of waste in the sense of Lean Management [2].

Reinhard Stötzel
Technical Product Manager
Global Expert,
ASK Chemicals India Pvt. Ltd.

	Waste	Definition	Examples
D	Defects	Incomplete or inaccurate information, products or services	Inaccurate application Broken parts Missed deadlines
O	Overproduction	Making more of something Making earlier or faster than needed	Extra copies of reports Redundant storage Cc on all emails
W	Waiting	Waiting for information, equipment, materials, parts or people	Waiting for approval Waiting for large batches
N	Non-utilized Talent	Not properly utilizing people's experience, skills, knowledge or creativity	Employees unable to make decisions Employees not fully trained Skilled employees doing unskilled tasks
T	Transportation	Unnecessary movement of material, information or equipment	Hands-off between functions Multiple reviews
I	Inventory	Accumulation of parts, information, applications, etc. what is required by the customer	Stockpiling supplies Information piling up for data entry Keeping data longer than necessary
M	Motion	Any movement by people that is not of value to the customer	Repetitive keystrokes Walking between equipment Switching applications
E	Extra- Processing	Any steps that do not add value in the eyes of the customer	Extra processing, extra fields Extra features, excess details Extra report information

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* Develop a road map for Bauxite, Alumina and Aluminium industry in India.
* Provide a platform for primary and secondary aluminium producers to share knowledge and review latest developments in the entire value chain of Aluminium Industry.
* Application of Bauxite and Alumina in non-metallurgical industries.
* Digitisation Process and Digital Twins.
* Decarbonization and Green Aluminium.
* Aluminium recycling industry.

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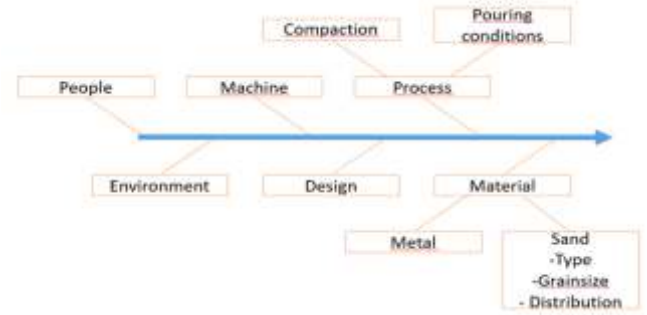
Conference Highlights

* A pre-conference workshop on 3D Printing will be organized by BITS and IIM Goa Chapter.
* Visionary leader outlines the future trajectory of the bauxite, alumina & aluminium industry.
* The latest developments & innovations in alumina refining, aluminium smelting & aluminium downstream/recycling technologies.
* A post conference visit to the HINDALCO Belagavi Alumina Refinery, Karnataka.

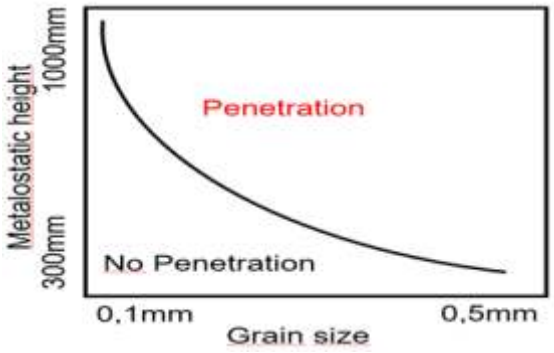
For participation and further details, please contact the IBAAS Office, India

This means, there is a significant potential for improvement and cost reductions based on saving both time and money. Leaner production in the foundry will provide a better "First Time Right" KPI figure, better logistics, less inventory, and last but not least, a better quality casting to improve your competitiveness in the market.

These defects are resulting from different causes that can be found in many different areas of the process. The following Ishikawa diagram states some of them:



The critical influencers are the sand, the metal, and the design of the casting. The sand is of great importance as its grain size and grain size distribution can have a great impact and contribute to major effects in the process. Fine sand typically does not lead to penetration or fusion, whereas coarse sand can create very severe defects. The figure below illustrates the critical relationship between sand grain size and metallostatic height andpenetration.



Another issue is the purity of the sand. Low melting point and fine impurities can create big problems. Furthermore, the type of sand, its morphology and grain size distribution have an influence on the compaction and the number of voids in the molded sand substrate. A broad distribution usually generates fewer voids compared to a narrow distribution. Sands, which are unclassified or even unwashed tend to create more penetration defects. Round or sub-angular sands are favored over an angular sand.

The casting conditions are also of very high importance:

The lower the pouring temperature, the better. In gray iron castings it makes a big difference if the casting is poured at 1380°C or at 1420°C. Every 5-10°C higher pouring temperature can make the penetration and fusion more severe.

The effects of the pouring height have already been emphasized in the figure above. Whenever it is possible to reduce the pouring height and kinetic energy (e.g. by modifying the gating system to a bottom gating system), it helps to reduce the defects. Another aspect is the viscosity of the melt: Higher amounts of sulfur or phosphorous in the melt reduce the viscosity and cause more penetration defects.

Last but not least, the design of the casting can also have a big impact on the defect. Domes, edges, or corners with small radii on the sand core or mold are hot spots in the casting and are prone to generating sand fusion and metal penetration.

A good refractory coating, even with highly refractory components like zircon, alumina,or magnesite, may not help in some cases, even when double or triple coated.

So how do we overcome this dilemma?

We ultimately want to have no voids in the sand, which are more prone to burn-in and burn-on. On the other hand, we want to have those voids to have good gas permeability. By using the TRIZ methodology of solving contradictions, we selected the "separation by time" principle [3].

Therefore, we have developed a coating, which has high gas permeability during mold filling but gets a kind of sintering and sealing of the coating layer later in the pouring process. Using this principle proved, that these casting defects can be

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eliminated despite the demanding thermal and metallostatic pressure of truck components.

Enclosed we see a list of truck components, which usually require the

Component	Coating characteristics required to prevent
Engine block	Veining, burn-in, scabbing, residue, tear drops formation
Cylinder head	Veining, burn-in, tear drops formation, for CGI / SGI graphite degradation
Axle housing	Veining, scabbing
Gear / Differential housing	Veining, burn-on
Turbo charger	Burn-on
Brake disk	Veining, burn-on
Hydraulic components	Veining, burn-on

We must emphasize, that the profile of the coatings could be quite different.

And we also see, that there is another demand which is the limitation of residue inside the casting. The VDA 19 (ISO 16232) guideline formulates a very specific requirement for automotive series casting. The residues in the components are limited in order to prolong the maintenance intervals for the motor vehicles. Residuals in the hollow spaces of the engine blocks cause the filters to clog early and work against the longer maintenance intervals required.

Conventional methods of casting cleaning such as sand blasting prove very time-consuming and thus detrimental to productivity where delicate geometries are involved. Special washing machines can provide support, though they mean more investment for the company and reduce productivity due to the process interruption.

Methodology

ASK has pilot foundries in the US and Germany, were casting trials can be carried out. Here we are using step cones, dome cores and flat transverse bar cores. After coating, place them in a mold and pour liquid iron at a relevant temperature and pouring height. With these tests the screening of the performance for a certain application can be done in a very efficient way and experience has shown, that in most cases the practical result in the foundry already gives a good initial result requiring only a few optimization and modification steps on site.

Experience has shown that, with coatings that are manufactured using cores coated with a MIRATEC coating, the blasting times in the blasting plant are halved compared to when a conventional coating is used, thereby eliminating penetration and veining.

CASE STUDY 1: METALLWERK FRANZ KLEINKEN GMBH, WULFEN (GERMANY)

Metallwerk Franz Kleinken GmbH, Wulfen (Germany) is a foundry with more than 100 years of experience for castings up to 30 tonnes in weight. Kleinken is a contact partner, specialist and problem solver for all challenges in the production and processing of individual castings and small series made of cast iron and non-ferrous metal castings.

Kleinken produces ductile iron "Cross Head" castings for application in die casting machines. Like most foundries facing rising energy and labour costs they are looking to optimise workflows through improved application technology. Conventionally the castings are produced with a running system; in this example a STELEX Optiflow3D Ø125 mm filter was applied in a Direct Pour application providing enhanced casting feeding, and yield improvement. Energy costs and labour costs are reduced by the application of the Direct Pour system increasing the casting yield and reducing the fettling area. In addition, the filter application assisted in the production or a casting with excellent integrity and surface finish.

The enhanced application of the high capacity STELEX Optiflow3D filter in the FEEDEX SCK Direct Pour System eliminated the need for a running system and eased subsequent removal since the small feeder neck had a minimal contact area (Figures 9, 10 and 11). The casting was sound with very good finished surface quality achieved. The returns were reduced by 94 kg (10 %) and the fettling area by 75 % (116 cm^2). This not only results in cost advantages for the foundry but also represents a relief for the environment through lower CO_2 emissions. The filter delivered a molten iron capacity of 7.0 kg/cm^2, which is almost double of what is normally considered as safe for a 10 ppi ceramic foam filter. If a ceramic foam filter had been applied, it would have needed to be a Ø175 mm filter.

CASTING DETAILS:

Alloy:	Ductile Iron (EN GJS 400-18)
Casting weight:	800 kg
Pouring temp.:	1350 °C
Pouring weight:	Conventional gating system - 959 kg
	STELEX Optiflow3D SCK Direct Pour - 865 kg
Pouring time:	Conventional gating - 50 s
	STELEX Optiflow3D SCK Direct Pour - 40 s
Moulding Process:	Hand moulding / Furane

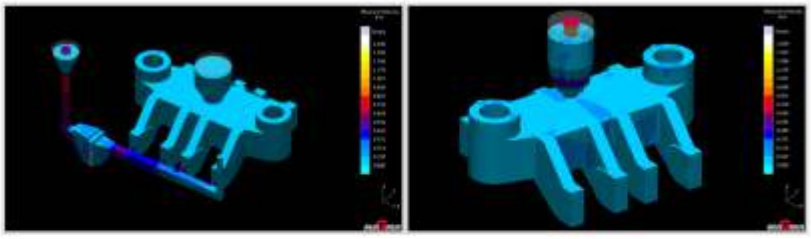

Figure 8. Magma representation comparing the conventional gating system (left) with the Direct Pour solution (right)

Figure 9. The STELEX Optiflow3D filter on the pattern plate

Figure 10. The casting

CASE STUDY 2: EICKHOFF GIESSEREI GMBH, BOCHUM (GERMANY)

Eickhoff Gießerei GmbH is part of the Eickhoff Group, a globally active family business which has been based in Bochum, Germany since its foundation in 1864. In addition to the foundry, the Eickhoff Group's portfolio includes mining machines as well as industrial and wind power gearboxes.

This application example of the STELEX Optiflow3D involves a planet carrier made of low-alloy steel. This casting is normally made without filters and with ceramic hollowware. In addition to the STELEX Optiflow3D Ø100x25, new HOLLOTEX EG Runner ST tubes suitable for steel casting and a 3D-printed filter holder were used for the revised casting system (Figure 11).

By using STELEX Optiflow3D filter, 3D-printed filter holder and HOLLOTEX EG Runner ST tubes, the casting weight was reduced by 8 kg and the surface quality slightly improved. Process-related non-metallic inclusions from the melting process were retained by the filter (Figure 12). Due to its manufacturing process, the filter provides a very consistent, reproducible structure allowing reliably high metal throughput in steel casting. The specific filter capacity of the STELEX Optiflow3D filter in this application was 3.9 kg/cm².

CASTING DETAILS:

Alloy:	GS 17 CrNiMo 6 V	
Casting weight:	230 kg	
Pouring temp.:	1610 °C	
Pouring weight:	Conventional gating system	317 kg
	STELEX Optiflow3D	309 kg
Pouring time:	Conventional gating	21 s
	STELEX Optiflow3D	24 s
Moulding Process:	Hand moulding / Furane	

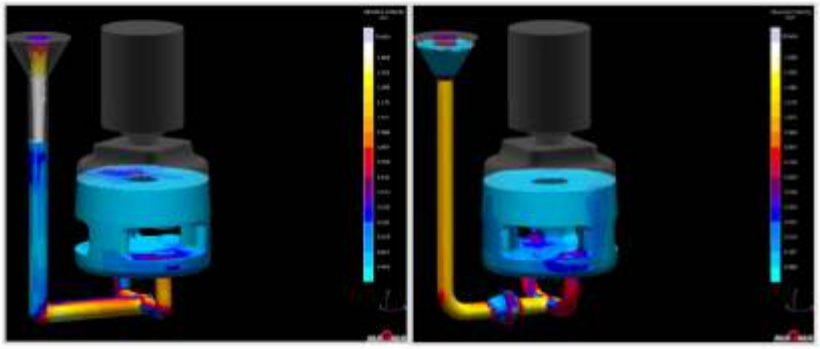

Figure 11. Magma representation comparing the conventional gating system (left) and the revised solution (right) using the STELEX Optiflow3D filter

Figure 12. The planet carrier produced with STELEX Optiflow3D after shake-out

Nick Child
International Marketing Manager, Clean Iron & Steel

Stephan Giebing
European Product Manager, Ferrous Filtration

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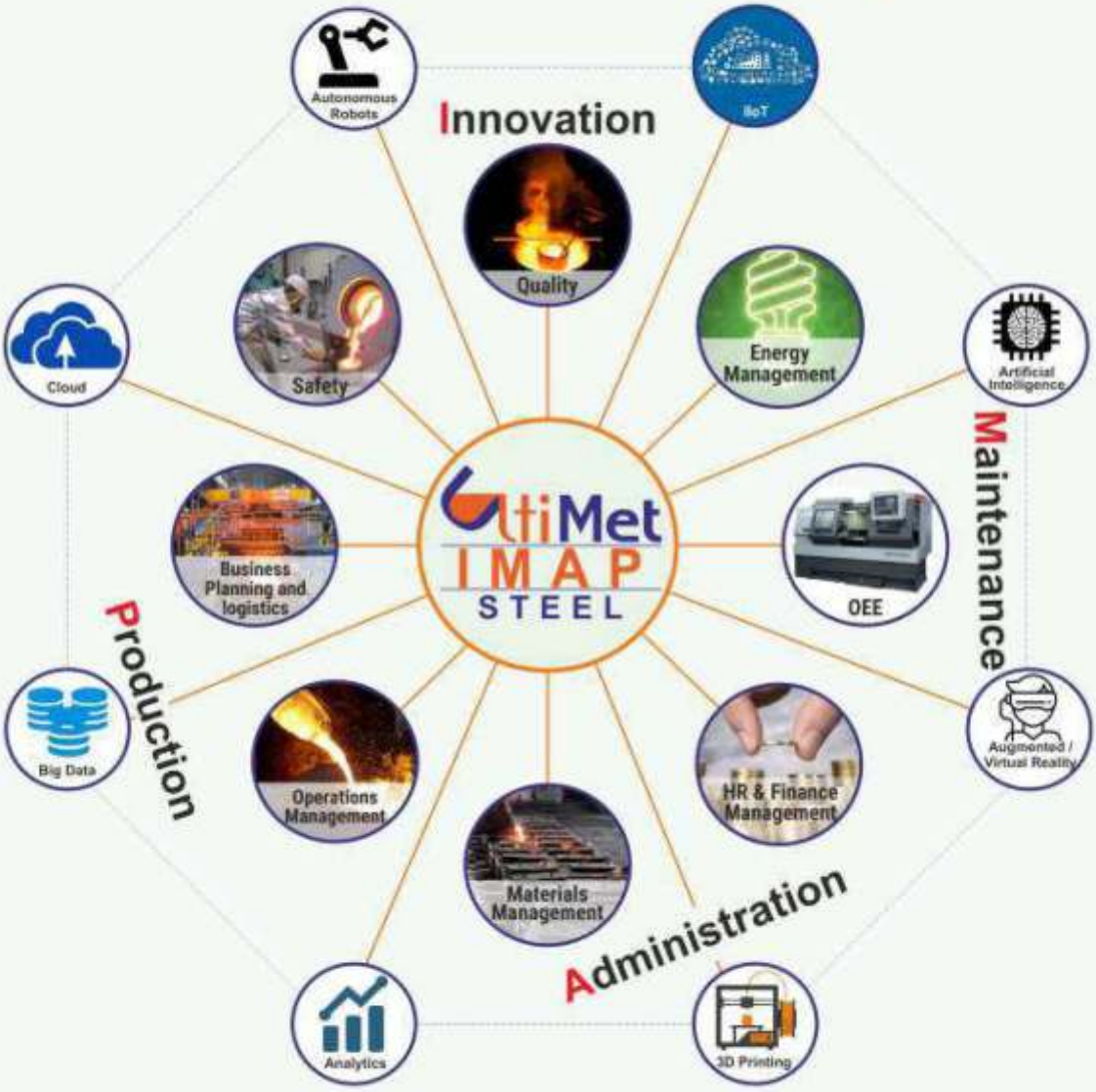

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Domestic passenger vehicle sales rise by 11% in February – SIAM

As per the recent month data published by Society of Indian Automobile Manufacturers (SIAM) reported sharp increase in Passenger vehicle sales by 11 percent year-on-year jump in dispatches to dealers in February, as sports utility vehicles (SUVs) continued to drive demand. It was the highest-ever February dispatch by car manufacturers.

Total dispatches of passenger vehicles (PVs) to dealerships stood at 370,786 units in February, 10.8 per cent higher than 334,790 units sent in February last year, data from the Society of Indian Automobile Manufacturers (SIAM) revealed.

Three-wheeler sales in February were at 54,584 units, up 8.3 percent. Two-wheelers continued their growth path selling 15,20,761 units in February, which was a sharp 34.6 percent jump. But the sales of commercial vehicles (CVs) remained muted. It saw a 0.7% decline in the wholesale volumes in February.

Vinod Aggarwal, President, SIAM said, "Passenger vehicles, two-wheelers, and three-wheelers have posted growth in February 2024 compared to the previous year, while commercial vehicles have witnessed a slight de-growth. Overall robust GDP growth of the country in Q3 of 2023-24 has helped the auto sector.

The Bharat Mobility Global Expo 2024 held in February 2024, graced by the Hon'ble Prime Minister, has also created a strong positive sentiment for the consumers and therefore the industry expects the growth momentum to continue."

SUVs, meanwhile, remained the major growth driver. Mahindra and Mahindra said on Monday that its SUV sales in the domestic market jumped 40 percent in February. PV exports have grown by 20.5 percent, while two-wheeler exports have grown by 39.5 percent.

Honda Motorcycle & Scooter India's (HMSI) scooter exports have more than doubled from 13,365 units in February 2023 to 28,008 units in February 2024. Hero MotoCorp's motorcycle exports have also nearly doubled to 22052 units this February from 11689 units last February.

Domestic Sales: Monthly

Category	Domestic Sales (In Nos.)	
Segment/Subsegment	February	
	2023	2024
Total Passenger Vehicles[3]	**3,34,790**	**3,70,786**
Three Wheelers		
Passenger Carrier	38,777	42,582
Goods Carrier	8,711	10,013
E-Rickshaw	2,615	1,509
E-Cart	279	480
Total Three Wheelers	**50,382**	**54,584**
Two Wheelers		
Scooter/ Scooterettee	3,91,054	5,15,340
Motorcycle/Step-Throughs	7,03,261	9,64,362
Mopeds	35,346	41,059
Total Two Wheelers	**11,29,661**	**15,20,761**
Quadricycle	**107**	**36**

[3] *BMW, Mercedes, JLR & Volvo Auto data are not available. Tata Motors Domestic Sales data included only in 'Total PV', detailed break-up is not available. However, without Tata Motors, 'Total PV' would be 2,91,928 for February 2023 and 3,19,519 for February 2024*

SIAM						
Segment wise Comparative Production, Domestic Sales & Exports data for the month of February 2024						
						(Number of Vehicles)
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	February		February		February	
	2023	2024	2023	2024	2023	2024
Passenger Vehicles (PVs)*						
Passenger Cars	1,69,626	1,51,538	1,42,201	1,15,937	25,207	31,440
Utility Vehicles (UVs)	1,56,602	2,21,955	1,38,238	1,91,435	19,512	21,819
Vans	11,550	13,248	11,489	12,147	140	784
Total Passenger Vehicles (PVs)	**3,37,978**	**3,86,741**	**2,91,928**	**3,19,519**	**44,859**	**54,043**
Three Wheelers						
Passenger Carrier	56,978	65,687	38,777	42,582	19,386	25,203
Goods Carrier	8,191	10,797	8,711	10,013	254	638
E-Rickshaw	2,516	754	2,615	1,509	-	-
E-Cart	407	567	279	480	-	-
Total Three Wheelers	**68,092**	**77,805**	**50,382**	**54,584**	**19,640**	**25,841**
Two Wheelers						
Scooter/ Scooterettee	4,40,901	5,67,463	3,91,054	5,15,340	33,378	47,364
Motorcycle/Step-Throughs	8,72,062	12,19,447	7,03,261	9,64,362	2,01,097	2,80,142
Mopeds	35,706	42,624	35,346	41,059	612	576
Total Two Wheelers	**13,48,869**	**18,29,534**	**11,29,661**	**15,20,761**	**2,35,087**	**3,28,082**
Quadricycle	**452**	**331**	**107**	**36**	**348**	**456**
Grand Total	**17,55,191**	**22,94,411**	**14,72,078**	**18,94,900**	**2,99,934**	**4,08,422**
* BMW, Mercedes, JLR, Tata Motors and Volvo Auto data is not available						
Society of Indian Automobile Manufacturers (12/03/2024)						

SIAM						
Summary Report: Cumulative Production, Domestic Sales & Exports data for the period of April-February 2024						
						Report I (Number of Vehicles)
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	April-February		April-February		April-February	
	2022-23	2023-24	2022-23	2023-24	2022-23	2023-24
Passenger Vehicles (PVs)*						
Passenger Cars	19,72,794	17,88,659	15,79,029	13,96,836	3,72,497	3,91,631
Utility Vehicles (UVs)	19,62,297	24,42,849	17,57,158	22,11,831	2,18,478	2,10,638
Vans	1,26,605	1,32,929	1,25,593	1,33,538	457	7,236
Total Passenger Vehicles (PVs)	**40,81,696**	**43,64,437**	**34,61,780**	**37,42,205**	**5,91,432**	**6,09,505**
Three Wheelers						
Passenger Carrier	6,61,579	7,74,583	3,20,963	5,02,125	3,41,819	2,72,257
Goods Carrier	89,553	1,04,148	86,679	99,864	4,396	3,439
E-Rickshaw	24,641	28,737	23,936	29,595	-	-
E-Cart	3,055	3,407	2,830	3,442	-	-
Total Three Wheelers	**7,78,828**	**9,10,875**	**4,34,408**	**6,35,026**	**3,46,215**	**2,75,696**
Two Wheelers						
Scooter/ Scooterettee	51,13,161	58,42,185	47,53,085	53,72,713	3,74,014	4,68,460
Motorcycle/Step-Throughs	1,23,79,726	1,33,19,166	94,14,380	1,06,73,137	30,29,006	26,60,607
Mopeds	3,99,946	4,44,480	4,04,753	4,40,936	3,528	2,232
Total Two Wheelers	**1,78,92,833**	**1,96,05,831**	**1,45,72,218**	**1,64,86,786**	**34,06,548**	**31,31,299**
Quadricycle	**2,356**	**4,196**	**620**	**694**	**1,854**	**3,536**
Grand Total	**2,27,55,713**	**2,48,85,339**	**1,84,69,026**	**2,08,64,711**	**43,46,049**	**40,20,036**
* BMW, Mercedes, JLR, Volvo Auto data is not available and Tata Motors data is available for April-December only						
Society of Indian Automobile Manufacturers (12/03/2024)						

SIAM

Category & Company wise Summary Report for the month of February 2024 and Cumulative for April-February 2024

Report II

(Number of Vehicles)

Category	Production				Domestic Sales				Exports			
Segment/Subsegment	February		April-February		February		April-February		February		April-February	
Manufacturer	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24
Passenger Vehicles (PVs)												
FCA India Automobiles Pvt Ltd	1 000	370	15,387	8,096	917	331	11 795	4 981	930	160	4 612	4 010
Force Motors Ltd	42	142	663	1,770	69	98	977	1 982	1	-	6	3
Honda Cars India Ltd	9 535	15,990	1,06,687	1,15,566	5,026	7,142	87 726	79 513	969	5,836	19,527	30 729
Hyundai Motor India Ltd	55 401	67,599	5,47,478	7,16,209	47,007	50,201	5,16 946	5,61 720	10,850	10,300	1 42,179	1,50 555
Isuzu Motors India Pvt Ltd	66	97	1,971	306	66	28	857	483	-	-	355	6
Kia Motors India Pvt Ltd	30 309	22,721	3,29,395	2,75,944	24,650	20,200	2,47 726	2,24 234	7,406	1,308	79,554	50 403
Mahindra & Mahindra Ltd	30 576	44,106	3,30,225	4,32,636	30,355	42,401	3,23 256	4,19 246	1,408	560	9,659	10 595
Maruti Suzuki India Ltd	1,56 430	1,74,543	17,27,981	17,86,810	1 47,487	1,60,271	14,74 107	16,07 169	16,956	25,670	2 26,179	2,55 150
MG Motor India Pvt Ltd	4 327	4,572	49,857	43,972	4,193	3,030	42 615	40 823	-	-	12	-
Nissan Motor India Pvt Ltd	7 253	6,952	87,375	66,420	2,184	2,755	30 351	27 445	3,882	3,163	53,378	36 031
PCA Motors Pvt. Ltd	373	700	7,128	8,050	328	421	7 047	7 361	-	253	-	2 588
Renault India Pvt Ltd	10 102	4,898	1,11,170	43,935	8,616	4,080	73 537	41 214	1,537	88	29,477	10 429
SkodaAuto India Pvt Ltd	4 225	2,915	51,561	42,552	3,415	2,254	47 837	41 718	118	-	405	1 402
Tata Motors Ltd	NA	NA	4,09,173	4,17,241	NA	NA	4,08 087	4,24 350	NA	NA	1,766	1 998
Toyota Kirloskar Motor Pvt Ltd	22 495	33,698	1,43,323	3,20,686	15,323	23,293	1,54 796	2,20 804	347	1,520	555	15 322
Volkswagen India Pvt Ltd	5 534	7,400	69,227	81,241	3,311	3,019	37 446	39 866	755	1,686	23,995	39 576
Total Passenger Vehicles (PVs)	**3,37,978**	**3,86,741**	**40,81,696**	**43,64,437**	**2,91,928**	**3,19,519**	**34,61,780**	**37,42,205**	**44,859**	**54,043**	**5,91,432**	**6,09,505**

* Only cumulative data is available for Ashok Leyland Ltd. NA=Not Available

SIAM

Category & Company wise Summary Report for the month of February 2024 and Cumulative for April-February 2024

Report II

(Number of Vehicles)

Category	Production				Domestic Sales				Exports			
Segment/Subsegment	February		April-February		February		April-February		February		April-February	
Manufacturer	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24
Three Wheelers												
Atul Auto Ltd	1,810	2,255	22,392	23,717	1,837	2,120	19,998	20 912	198	180	2,397	1,999
Bajaj Auto Ltd	42,749	50,547	4,35,555	5 58,043	32,849	36,331	2,85,379	4,26 055	11,566	15,155	1 72,130	1,40,706
Continental Engines Pvt Ltd	282	451	5,642	5,967	297	357	5,743	5 711	-	-	-	-
Force Motors Ltd	350	200	2,802	3,743	-	-	-	-	196	14	2,680	3,040
Mahindra & Mahindra Ltd	5,196	5,226	53,793	72,105	5,350	6,198	52,823	72 310	-	60	463	463
Piaggio Vehicles Pvt Ltd	8,137	8,818	99,265	1 02,914	5,606	7,552	75,225	91 336	(92)	1,884	23,814	11,577
TVS Motor Company Ltd	5,568	10,000	1,59,475	1 34,365	1,343	2,066	14,740	18 703	7,787	8,548	1 44,751	1,17,321
Total Three Wheelers	**68,092**	**77,805**	**7,78,828**	**9,10,875**	**50,382**	**54,584**	**4,34,408**	**6,35,026**	**19,640**	**25,841**	**3,46,215**	**2,75,696**
Two Wheelers												
Ather Energy Pvt. Ltd	12,092	10,658	81,396	96,669	12,147	11,094	80,658	96 073	-	80	-	246
Bajaj Auto Ltd	2,54,310	2 89,792	32,05,912	33 96,589	1,15,039	1,68,727	16,49,165	20,57 314	1,75,027	1,24,157	15 42,241	13,46,457
Chetak Technology Ltd	500	2,500	5,335	11,130	2,256	1,600	4,437	10 267				
Hero MotoCorp Ltd	3,68,853	4 41,595	47,68,044	50 06,332	3,52,317	4,45,095	46,53,083	49,61 113	12,143	20,148	1 56,140	1,69,758
Honda Motorcycle & Scooter India Pvt Ltd	2,25,405	4 31,302	40,87,428	45 11,550	2,27,084	4,13,967	38,27,985	41,72 045	20,111	44,744	3 10,991	3,35,031
India Kawasaki Motors Pvt Ltd	516	247	3,878	2,615	375	458	3,641	2 090	-	-	-	-
India Yamaha Motor Pvt Ltd	56,606	79,045	7,79,833	8 49,384	39,397	56,538	6,24,975	6,36 325	15,694	21,873	2 51,428	1,99,207
Mahindra Two Wheelers Ltd			72				96					
Okinawa Autotech Pvt. Ltd	6,166	1,394	92,650	10,139	6,726	1,244	96,275	13 557	-	-	76	-
Piaggio Vehicles Pvt Ltd	4,824	4,041	58,139	47,569	2,900	3,041	41,155	35 008	1,216	1,028	16,632	12,891
Royal-Enfield (Unit of Eicher Motors)	63,490	78,313	7,58,195	8 50,184	64,436	67,922	6,74,856	7,88 791	7,108	8,013	87,704	65,430
Suzuki Motorcycle India Pvt Ltd	86,052	1 00,521	8,56,178	10 24,747	52,455	83,304	6,57,687	8,32 845	18,179	14,151	1 83,190	1,95,389
Triumph Motorcycles India Pvt Ltd	52	45	598	606	87	69	979	680				
TVS Motor Company Ltd	2,69,741	3 31,160	31,95,244	37 19,650	2,21,402	2,67,502	23,57,156	28,96 510	45,624	90,308	8 48,239	8,03,860
Total Two Wheelers	**13,48,669**	**16,29,534**	**1,78,92,833**	**1,96,05,831**	**11,29,661**	**15,20,761**	**1,45,72,218**	**1,64,86,786**	**2,35,087**	**3,28,082**	**34,06,548**	**31,31,289**
Quadricycle												
Bajaj Auto Ltd	452	331	2,356	4,196	107	36	620	694	348	456	1,854	3,536
Total Quadricycle	**452**	**331**	**2,356**	**4,196**	**107**	**36**	**620**	**694**	**348**	**456**	**1,854**	**3,536**
Grand Total	**17,55,191**	**22,94,411**	**2,27,55,713**	**2,48,85,339**	**14,72,078**	**18,94,900**	**1,84,69,026**	**2,08,64,711**	**2,99,934**	**4,08,422**	**43,46,049**	**40,20,036**

Society of Indian Automobile Manufacturers (12/03/2024)

SIAM

Segment & Company wise Production, Domestic Sales & Exports Report for the month of February 2024 and Cumulative for April-February 2024

Report III

(Number of Vehicles)

Category	Production				Domestic Sales				Exports			
Segment/Subsegment	February		April-February		February		April-February		February		April-February	
Manufacturer	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24
Three Wheelers												
A: Passenger Carrier												
Atul Auto Ltd	476	702	9,840	8,771	415	528	7,381	6,666	184	172	2,279	1 893
Bajaj Auto Ltd	38,826	46,100	4,00,251	5,19,247	28,589	31,807	2,37,256	3,79,172	11,374	14,647	1,70,478	1,39 250
Continental Engines Pvt Ltd	92	74	1,562	955	80	53	1,659	919				
Force Motors Ltd	350	200	2,802	3,743	-	-	-	-	196	14	2,680	3 640
Mahindra & Mahindra Ltd	1,626	2,276	18,222	36,067	1,766	3,276	18,201	35,154		60	337	409
Piaggio Vehicles Pvt Ltd	6,132	5,687	71,204	72,623	6,314	7,907	69,110	91,960	(92)	1,880	22,616	10 626
TVS Motor Company Ltd	9,476	9,832	1,57,708	1,33,176	1,308	2,021	14,346	18,364	7,724	8,430	1,43,440	1,16 439
Total A: Passenger Carrier	**56,978**	**66,987**	**6,61,579**	**7,74,583**	**38,777**	**42,582**	**3,20,953**	**5,02,125**	**19,386**	**25,203**	**3,41,819**	**2,72,267**
E-Rickshaw												
Atul Auto Ltd	167	254	2,881	4,393	241	375	2,925	4,793				
Continental Engines Pvt Ltd	99	251	1,923	4,117	90	189	1,342	4,010	-	-	-	-
Mahindra & Mahindra Ltd	2,250	259	20,437	19,732	2,284	945	19,689	20,792				
Total E-Rickshaw	**2,516**	**764**	**24,641**	**28,737**	**2,615**	**1,509**	**23,936**	**29,595**	-	-	-	-
B: Goods Carrier												
Atul Auto Ltd	1,060	986	8,769	8,232	1,160	967	8,647	7,856	4	8	118	106
Bajaj Auto Ltd	3,923	4,741	35,904	48,798	3,960	4,530	34,623	46,083	192	209	1,622	1 456
Continental Engines Pvt Ltd	91	137	2,826	709	123	58	2,696	589	-	-	-	-
Mahindra & Mahindra Ltd	1,020	1,844	12,912	14,933	1,141	1,722	13,204	14,812	-	-	120	44
Piaggio Vehicles Pvt Ltd	2,005	2,921	28,761	30,291	2,289	2,857	27,715	29,375	1	304	1,198	851
TVS Motor Company Ltd	92	168	1,581	1,187	35	45	394	349	57	118	1,332	882
Total B: Goods Carrier	**8,191**	**10,797**	**89,553**	**1,04,148**	**8,711**	**10,013**	**86,679**	**99,864**	**254**	**638**	**4,396**	**3,439**
E-Cart												
Atul Auto Ltd	107	301	1,102	1,822	121	250	1,045	1,697	-	-	-	-
Continental Engines Pvt Ltd	-	19	31	211	1	17	36	193	-	-	-	-
Mahindra & Mahindra Ltd	300	247	1,922	1,374	157	213	1,749	1,552	-	-	-	-
Total E-Cart	**407**	**567**	**3,055**	**3,407**	**279**	**480**	**2,830**	**3,442**	-	-	-	-
Total Three Wheelers	**68,092**	**77,805**	**7,78,828**	**9,10,875**	**50,382**	**54,584**	**4,34,408**	**6,35,026**	**19,640**	**25,841**	**3,46,215**	**2,75,696**

Segment & Company wise Production, Domestic Sales & Exports Report for the month of February 2024 and Cumulative for April-February 2024												
												Report III
												(Number of Vehicles)
Category	Production				Domestic Sales				Exports			
Segment/Subsegment	February		April-February		February		April-February		February		April-February	
Manufacturer	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24
Passenger Vehicles (PVs)												
A: Passenger Cars												
Honda Cars India Ltd	9,245	7,705	1,00,607	75,643	6,026	3,556	79,785	49,748	854	2,326	18,876	23,654
Hyundai Motor India Ltd	30,365	29,650	3,43,639	3,35,364	24,793	16,811	2,42,436	2,09,208	5,822	8,756	99,671	1,25,264
Mahindra & Mahindra Ltd	-	-	-	-	-	-	274	-	-	-	-	-
Maruti Suzuki India Ltd	1,15,357	1,04,403	12,60,320	11,27,886	1,02,865	86,890	10,25,636	8,98,183	13,468	16,839	1,84,080	1,79,317
MG Motor India Pvt Ltd	-	NA	-	3,052	-	NA	-	1,914	-	-	-	-
Nissan Motor India Pvt Ltd	4,426	3,900	44,318	30,201	-	-	-	-	3,765	2,204	43,490	29,741
Renault India Pvt Ltd	2,653	900	20,116	10,768	1,758	825	18,215	9,240	543	79	8,850	3,781
SkodaAuto India Pvt Ltd	1,777	915	26,165	16,437	1,446	1,028	23,500	17,885	-	-	-	22
Tata Motors Ltd^	NA	NA	1,35,198	1,41,704	NA	NA	1,35,177	1,41,971	NA	NA	150	1,384
Toyota Kirloskar Motor Pvt Ltd	76	249	874	2,217	4,250	4,791	37,292	50,080	-	-	-	-
Volkswagen India Pvt Ltd	2,910	4,332	32,957	40,589	1,583	1,631	16,574	19,247	755	1,136	17,408	25,439
Total A: Passenger Cars	**1,69,826**	**1,61,538**	**19,72,794**	**17,88,659**	**1,42,201**	**1,15,937**	**15,79,029**	**13,98,835**	**25,207**	**31,440**	**3,72,497**	**3,91,631**
B: Utility Vehicles (UVs)												
ICA India Automobiles Pvt Ltd	1,000	376	15,887	8,056	917	331	11,765	4,981	631	160	4,672	4,016
Force Motors Ltd	42	142	663	1,770	60	98	877	1,682	1	-	8	9
Honda Cars India Ltd	390	8,281	5,880	42,923		3,184	4,941	39,355	115	3,610	648	7,075
Hyundai Motor India Ltd	25,030	37,749	3,09,839	3,80,845	22,508	33,390	2,74,510	3,52,512	5,028	1,544	42,508	25,271
Isuzu Motors India Pvt Ltd	56	97	1,971	306	66	23	657	463			355	5
Kia Motors India Pvt Ltd	30,309	22,723	3,29,399	2,75,944	24,000	20,200	2,47,728	2,24,234	7,400	1,300	79,554	50,409
Mahindra & Mahindra Ltd	39,858	44,076	3,97,879	4,39,356	36,227	42,401	3,90,985	4,19,933	1,373	540	9,600	10,954
Maruti Suzuki India Ltd	26,661	58,672	3,47,123	5,29,528	33,550	61,234	3,29,075	5,83,660	3,363	10,967	41,712	68,927
MG Motor India Pvt Ltd	4,397	4,577	48,857	40,920	4,193	3,030	42,815	38,909			42	
Nissan Motor India Pvt Ltd	2,828	3,902	43,057	36,219	2,184	2,755	30,351	27,445	117	959	9,868	6,830
PCA Motors Pvt. Ltd	373	700	7,129	8,050	326	421	7,047	7,381		253		2,668
Renault India Pvt Ltd	7,439	3,918	82,054	33,169	4,858	3,252	55,322	31,974	904	10	26,591	6,638
SkodaAuto India Pvt. Ltd	2,448	2,300	25,396	26,115	1,972	1,228	24,337	23,550	116		408	1,360
Tata Motors Ltd^	NA	NA	2,70,261	2,75,447	NA	NA	2,68,570	2,73,974	NA	NA	1,536	515
Toyota Kirloskar Motor Pvt Ltd	22,419	33,449	1,42,449	3,10,469	11,033	18,502	1,17,508	1,70,544	347	1,920	555	15,322
Volkswagen India Pvt Ltd	2,416	3,098	29,970	32,842	1,748	1,388	20,872	20,421	-	550	6,500	11,140
Total B: Utility Vehicles (UVs)	**1,56,602**	**2,21,955**	**19,82,297**	**24,42,849**	**1,38,238**	**1,91,435**	**17,57,158**	**22,11,831**	**19,512**	**21,819**	**2,18,478**	**2,10,638**
C: Vans												
Mahindra & Mahindra Ltd	720	90	2,363	240	137	-	2,057	13	35	20	50	231
Maruti Suzuki India Ltd	11,430	13,218	1,20,538	1,32,589	11,352	12,147	1,19,199	1,25,120	105	764	378	6,906
Tata Motors Ltd^	NA	NA	3,714	90	NA	NA	4,340	8,405	NA	NA	50	90
Total C: Vans	**11,550**	**13,248**	**1,26,505**	**1,32,929**	**11,489**	**12,147**	**1,25,593**	**1,33,538**	**140**	**784**	**457**	**7,235**
Total Passenger Vehicles (PVs)	**3,37,978**	**3,86,741**	**40,81,596**	**43,64,437**	**2,91,928**	**3,19,519**	**34,61,780**	**37,42,205**	**44,859**	**54,043**	**5,91,432**	**6,09,505**

^Only cumulative data is available for Apr-Dec NA: Not Available

SIAM												
Segment & Company wise Production, Domestic Sales & Exports Report for the month of February 2024 and Cumulative for April-February 2024												
												Report III
												(Number of Vehicles)
Category	Production				Domestic Sales				Exports			
Segment/Subsegment	February		April-February		February		April-February		February		April-February	
Manufacturer	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24
Two Wheelers												
A: Scooter/ Scooterettes												
Ather Energy Pvt. Ltd	12,092	10,658	81,356	96,660	12,147	11,084	80,658	96,073	-	80	-	276
Bajaj Auto Ltd	2,027	14,206	29,904	1,07,127	382	10,620	28,359	1,03,760	-	-	5	74
Chetak Technology Ltd	500	2,900	5,335	11,150	2,296	1,800	4,431	10,267	-	-	-	-
Hero MotoCorp Ltd	24,714	31,928	3,40,296	3,69,851	22,152	30,387	3,27,291	3,71,010	464	1,006	9,654	26,074
Honda Motorcycle & Scooter India Pvt. Ltd	1,93,959	2,55,316	23,78,400	25,56,355	1,59,127	2,29,783	22,33,121	23,51,557	13,365	28,018	1,73,864	2,15,313
India Yamaha Motor Pvt Ltd	10,380	23,600	1,92,628	2,82,216	8,186	20,774	1,89,418	2,53,714	1,212	3,992	28,735	34,081
Okinawa Autotech Pvt. Ltd	6,165	1,094	92,650	10,139	5,726	1,244	96,278	13,557			73	
Piaggio Vehicles Pvt Ltd	4,824	3,618	58,139	47,050	2,900	3,036	41,140	35,302	1,210	1,232	16,032	12,455
Suzuki Motorcycle India Pvt Ltd	74,081	88,457	7,27,499	8,73,033	50,486	81,480	6,39,449	8,08,219	8,958	5,960	74,078	73,961
TVS Motor Company Ltd	1,12,148	1,38,011	12,06,954	14,48,578	96,692	1,22,142	11,32,940	13,29,542	8,173	7,956	72,168	1,06,226
Total A: Scooter/ Scooterettes	**4,40,901**	**5,67,463**	**51,13,161**	**58,42,185**	**3,91,054**	**5,15,340**	**47,53,085**	**53,72,713**	**33,378**	**47,364**	**3,74,014**	**4,68,460**
B: Motorcycle/Step-Throughs												
Bajaj Auto Ltd	2,52,263	2,74,906	31,76,008	32,85,462	2,17,657	1,55,107	18,20,808	19,53,551	1,15,021	1,24,157	15,42,236	13,46,383
Hero MotoCorp Ltd	3,44,139	4,09,167	44,27,748	46,86,151	3,60,166	4,14,703	43,25,772	45,90,094	11,689	22,052	1,47,486	1,43,684
Honda Motorcycle & Scooter India Pvt. Ltd	37,496	2,05,906	17,09,029	19,55,165	37,957	1,84,184	15,94,865	15,20,466	6,746	16,736	1,37,327	1,18,715
India Kawasaki Motors Pvt Ltd	516	247	3,848	2,615	375	458	3,641	4,090	-	-	-	-
India Yamaha Motor Pvt Ltd	46,220	55,440	5,87,205	5,57,168	31,211	35,704	3,55,556	3,82,011	14,482	17,941	2,32,088	1,68,126
Mahindra Two Wheelers Ltd			72				95					
Piaggio Vehicles Pvt Ltd	-	423	-	539	-	5	9	6	-	396	-	436
Royal Enfield (Unit of Eicher Motors)	63,490	76,313	7,56,195	8,50,154	64,436	67,022	6,74,958	7,66,751	7,108	9,013	67,704	68,430
Suzuki Motorcycle India Pvt Ltd	11,973	14,368	1,28,679	1,51,711	1,908	1,844	18,238	26,626	9,212	9,071	1,09,022	1,21,726
Triumph Motorcycles India Pvt Ltd	52	45	596	606	67	69	979	980	-	-	-	-
TVS Motor Company Ltd	1,21,387	1,50,944	16,88,344	18,26,592	89,404	1,04,301	8,19,463	11,25,940	36,889	51,776	6,72,943	6,96,402
Total B: Motorcycle/Step-Throughs	**8,72,062**	**12,19,447**	**1,23,79,726**	**1,33,19,166**	**7,03,261**	**9,64,362**	**94,14,380**	**1,06,73,137**	**2,01,097**	**2,80,142**	**30,29,006**	**26,60,607**
C: Mopeds												
TVS Motor Company Ltd	35,706	42,624	3,99,946	4,44,480	35,346	41,059	4,04,753	4,40,936	612	576	3,528	2,232
Total C: Mopeds	**35,706**	**42,624**	**3,99,946**	**4,44,480**	**35,346**	**41,059**	**4,04,753**	**4,40,936**	**612**	**576**	**3,528**	**2,232**
Total Two Wheelers	**13,48,669**	**18,29,534**	**1,78,92,833**	**1,96,05,831**	**11,29,661**	**15,20,761**	**1,45,72,218**	**1,64,86,786**	**2,35,087**	**3,28,082**	**34,06,548**	**31,31,299**
Quadricycle												
Bajaj Auto Ltd	452	331	2,356	4,196	107	36	620	694	348	456	1,854	3,536
Total Quadricycle	**452**	**331**	**2,356**	**4,196**	**107**	**36**	**620**	**694**	**348**	**456**	**1,854**	**3,536**
Grand Total	**17,55,191**	**22,94,411**	**2,27,55,713**	**2,48,85,338**	**14,72,078**	**18,94,900**	**1,84,59,025**	**2,08,64,711**	**2,99,934**	**4,08,422**	**43,45,049**	**40,20,036**
Source: Society of Indian Automobile Manufacturers (12/03/2024)												

SIAM

Sub-segment & Company wise Production, Domestic Sales & Exports Report for the month of February 2024 and Cumulative for April-February 2024

Report IV

(Number of Vehicles)

Category	Production				Domestic Sales				Exports			
Segment/Subsegment	February		April-February		February		April-February		February		April-February	
Manufacturer	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24
Passenger Vehicles (PVs)												
A : Passenger Cars - Upto 5 Seats												
Micro :Seats upto-4, Length Normally <3200 mm, Body Style-Hatchback, Engine Displacement Normally upto 0.8 Litre												
MG Motor India Pvt Ltd (Comet EV)	-	NA	-	3,052	-	NA	-	1,914	-	-	-	-
Total Micro	-	-	-	**3,052**	-	-	-	**1,914**	-	-	-	-
Mini :Seats upto-5, Length Normally <3600 mm, Body Style-Hatchback, Engine Displacement Normally upto 1.0 Litre												
Maruti Suzuki India Ltd (Alto,S-Presso)	20,295	10 591	2,67,848	1 58,255	21 875	14,782	2 21,329	1,39 266	2,620	1,720	39,777	29 539
Renault India Pvt Ltd (Kwid)	2,553	980	29,116	10,755	1 758	228	18,215	9 240	543	79	8,850	3 791
Total Mini	**22,961**	**14,671**	**2,96,964**	**1,67,054**	**23,633**	**15,610**	**2,39,544**	**1,39,505**	**3,163**	**1,799**	**48,657**	**33,329**
Compact :Seats upto-5, Length Normally between 3600 - 4000 mm, Body Style-Sedan/Estate/Hatch/Notchback, Engine Displacement Normally upto 1.4 Litre												
Honda Cars India Ltd (Amaze,Jazz)	4,935	2 359	49,657	35,050	4 123	2,774	47,440	33 308	54	36	992	844
Hyundai Motor India Ltd (Aura,Grand i10,i20 Sportz,Xcent	26,139	24 486	2,89,881	2 58,482	24 446	15,731	3 26,422	1,30 895	3,579	5,781	81,914	74 637
Maruti Suzuki India Ltd (OEM Model# Baleno,Ciaz,Dzi	37,274	36 097	9,67,819	9 48,775	79 090	71,627	7 91,197	7,58 171	9,776	14,274	1 32,149	1,35 809
Tata Motors Ltd* (Altroz,Tiago,Tigor)	NA	NA	1,35,182	1 41,704	NA	NA	1 35,177	1,41 971	NA	NA	150	1 387
Toyota Kirloskar Motor Pvt Ltd (Glanza)	-	-	-	-	1 223	1,887	36,491	41 943	-	-	-	-
Volkswagen India Pvt Ltd (Polo)	-	-	874	-	-	-	753	-	-	-	1,095	82
Total Compact	**1,30,338**	**1,16,254**	**14,43,429**	**13,81,371**	**1,12,690**	**94,113**	**12,37,390**	**11,62,319**	**13,439**	**19,591**	**1,96,300**	**2,16,968**
Super Compact :Seats upto-5, Length Normally between 4000 - 4250 mm, Body Style-Sedan/Estate/Hatch/Notchback, Engine Displacement Normally upto 1.6 Litre												
Mahindra & Mahindra Ltd (Nuvio)	-	-	-	-	-	-	214	-	-	-	-	-
Total Super Compact	-	-	-	-	-	-	**214**	-	-	-	-	-
Mid-Size: Seats upto-5, Length Normally between 4250 - 4500 mm, Body Style-Sedan/Estate/Hatch/Notchback, Engine Displacement Normally upto 1.6 Litre												
Honda Cars India Ltd (City)	4,320	5 040	57,150	40,675	1 953	1,784	32,345	25 809	770	2,290	17,856	22 810
Hyundai Motor India Ltd (Verna)	2,226	5 357	53,753	78,902	47	1,678	16 014	28 305	2,243	3,475	37,697	50 447
Maruti Suzuki India Ltd (Ciaz)	755	1 486	24,650	20,223	792	481	10,310	9 747	1,072	946	12,754	9 940
Nissan Motor India Pvt Ltd (Sunny)	4,425	3 060	44,312	30,201	-	-	-	-	3,755	2,204	43,450	29 741
Volkswagen India Pvt Ltd (Vento,Virtus)	2,915	4 332	37,483	18,589	1 563	1,631	15,821	19 247	755	1,136	16,315	22 374
Total Mid-Size	**14,674**	**19,249**	**2,05,362**	**2,18,528**	**4,366**	**4,974**	**77,490**	**73,108**	**8,605**	**10,050**	**1,27,540**	**1,41,312**
Executive :Seats upto-5, Length Normally between 4500 - 4700 mm, Body Style-Sedan/Estate/Notchback, Engine Displacement Normally upto 2 Litre												
SkodaAuto India Pvt Ltd (Octavia,Superb)	1,707	915	24,516	16,437	1 356	1,028	22 065	17 734				22
Total Executive	**1,707**	**915**	**24,516**	**16,437**	**1,356**	**1,028**	**22,065**	**17,734**	-	-	-	**22**
Premium :Seats upto-5, Length Normally between 4700 - 5000 mm, Body Style-Sedan/Estates, Engine Displacement Normally upto 3 Litre												
SkodaAuto India Pvt Ltd (Superb)	70	-	1,848	-	90	-	1,456	131	-	-	-	-
Toyota Kirloskar Motor Pvt Ltd (Camry)	78	249	874	2,217	67	210	891	2 117	-	-	-	-
Total Premium	**148**	**249**	**2,523**	**2,217**	**157**	**210**	**2,326**	**2,248**	-	-	-	-
Luxury :Seats upto-5, Length Normally Over 5000 mm, Body Style-Sedan/Estates, Engine Displacement Normally upto 3 Litre												
Hyundai Motor India Ltd (Other)	-	-	-	-	-	2	-	8	-	-	-	-
Total Luxury	-	-	-	-	-	**2**	-	**8**	-	-	-	-
Total Passenger Cars	**1,69,828**	**1,51,536**	**19,72,794**	**17,86,659**	**1,42,201**	**1,15,937**	**15,79,029**	**13,96,836**	**25,207**	**31,440**	**3,72,497**	**3,91,631**

* Only cumulative data is available for Apr-Dec NA=Not Available

#Only production volume of OEM Model is reported by Maruti Suzuki India Limited

SIAM

Sub-segment & Company wise Production, Domestic Sales & Exports Report for the month of February 2024 and Cumulative for April-February 2024

Report IV

(Number of Vehicles)

Category	Production				Domestic Sales				Exports			
Segment/Subsegment	February		April-February		February		April-February		February		April-February	
Manufacturer	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24	2023	2024	2022-23	2023-24
B: Utility Vehicles (UVs)												
B : Utility Vehicles/ Sports Utility Vehicles; 4x2 or 4x4 offroad capability ; Generally ladder on frame ; 2 box ; 5 Seats or more but upto 10 Seats.												
UVC : Length < 4000 mm & Price <20 Lakhs												
Honda Cars India Ltd (WR-V)	393	-	5,850	-	-	-	4,941	-	115	-	640	288
Hyundai Motor India Ltd (Exter,Venue)	9,411	19 120	1,18,315	1,05 520	9,957	16,515	1 10,520	1,82,107	1,321	727	7 492	11,535
Kia Motors India Pvt Ltd (Sonet)	12,495	8 237	1,12,940	1,02 773	9,856	9,102	89,419	92,634	3,117	735	26 688	30,495
Mahindra & Mahindra Ltd (Bolero,XUV100, Thar,XUV300 XU	15,246	21 273	1,93,740	2,22 070	18,595	20,752	1 89,257	2,19,468	486	259	6 052	4,528
Maruti Suzuki India Ltd (OEM Model # Brezza, Fronx, Jim	15,994	34 967	1,50,507	3,31 060	15,787	30,755	1 29,436	2,94,173	25	5,849	30 136	32,154
Nissan Motor India Pvt Ltd (Magnite)	2,825	3 902	41,811	36 219	2,754	2,765	29,288	27,443	114	959	9 020	6,574
PCA Motors Pvt Ltd (C3,EC3)	373	705	9,892	8 037	324	284	9,798	5,702	-	117	-	2,547
Renault India Pvt Ltd (Kiger,Triber)	7,439	3 918	82,064	32 169	7,958	3,262	86,522	31,874	997	170	20 981	6,668
Tata Motors Ltd* (Nexon,Punch)	NA	NA	2,29,059	2,42 881	NA	NA	2 27,639	2,42,175	NA	NA	1 530	514
Toyota Kirloskar Motor Pvt Ltd (Urban Cruiser)							22,155					
Total UVC	**67,109**	**92,872**	**9,70,793**	**11,69,396**	**61,581**	**82,926**	**9,60,897**	**10,75,713**	**5,872**	**9,059**	**1,02,955**	**95,361**
UV1 : Length 4000 to 4400 mm & Price <20 Lakhs												
Force Motors Ltd (Gurkha)	42	1	667	1b	60	-	677	-	1	-	6	2
Honda Cars India Ltd (Elevate)		8 281		42 923		5,184		50,365		3,670		6,509
Hyundai Motor India Ltd (Creta)	12,644	16 400	1,47,492	1,50 713	10,421	15,276	1 36,345	1,46,315	3 101	992	24 857	3,547
Kia Motors India Pvt Ltd (Seltos)	10,202	7 020	1,40,505	1,06 979	9,012	6,265	90,576	92,611	3,561	560	45 022	12,368
Maruti Suzuki India Ltd (OEM Model # Ertiga,Grand Vitara	5,608	17 225	1,31,736	1,65 381	15,655	26,521	1 97,968	2,44,808	3,357	1,065	11 736	35,579
MG Motor India Pvt Ltd (Astor)	991	1 274	15,979	3 336	1,029	1,036	14,450	9,295	-	-	-	-
Nissan Motor India Pvt Ltd (Kicks)			1,246				1,055		3		65	15
PCA Motors Pvt Ltd (C3 Aircross)		736		1 980		127		1,570		138		141
SkodaAuto India Pvt Ltd (Kushaq)	2,205	1 883	24,046	22 791	1,753	1,107	23,048	22,102	118	-	406	1,360
Toyota Kirloskar Motor Pvt Ltd (Mode Manufactured for t	14,190	21 092	68,646	1,81 026	3,307	6,331	19,365	48,236	317	1,920	510	15,320
Volkswagen India Pvt Ltd (Taigun)	2,270	2 919	28,700	30 720	1,655	1,286	19,779	18,897	-	550	6 900	11,140
Total UV1	**51,152**	**76,333**	**5,57,947**	**7,10,204**	**41,913**	**61,163**	**4,73,276**	**6,14,100**	**10,478**	**11,136**	**89,102**	**86,920**
UV2 : Length between 4400 - 4700 mm & Price <20 Lakhs												
Hyundai Motor India Ltd (Alcazar)	2,391	1 050	34,494	29 705	1,559	1,200	24,177	19,300	906	525	10 159	9,580
Kia Motors India Pvt Ltd (Carens)	7,219	6 763	71,963	67 122	6,249	4,832	64,212	58,430	738	605	7 703	7,522
Mahindra & Mahindra Ltd (Marazzo,Scorpio,XUV500,XUV7	12,672	22 803	1,33,666	2,10 326	11,625	27,642	1 31,272	1,99,765	887	251	3 548	6,038
Maruti Suzuki India Ltd (XL6)	2,719	4 890	34,856	43 087	2,708	4,082	32,959	40,695	1	50	140	584
MG Motor India Pvt Ltd (Hector)	2,330	3 043	24,947	28 051	2,558	1,806	21,470	25,648	-	-	19	-
Tata Motors Ltd* (Harrior,Safari)	NA	NA	41,202	32 500	NA	NA	40,331	31,799	NA	NA	6	1
Total UV2	**26,671**	**38,958**	**3,41,182**	**4,10,857**	**24,099**	**33,888**	**3,15,731**	**3,75,500**	**2,532**	**1,464**	**21,268**	**24,332**
UV3 : Length >4700 mm & Price <20 Lakhs												
Force Motors Ltd (Trax)		104	34	1 716		91		1,675				1
Isuzu Motors India Pvt Ltd (D-Max,V-Cross)	65	-	1,925	56	63	-	807	365	-	-	355	6
Toyota Kirloskar Motor Pvt Ltd (Innova Crysta,Innova HyC	4,937	8 376	47,575	89 110	4,171	8,481	47,480	88,280	-	-	-	-
Total UV3	**5,002**	**8,480**	**49,500**	**90,882**	**4,234**	**8,572**	**48,105**	**90,320**	-	-	**355**	**7**

* Only cumulative data is available for Apr-Dec NA=Not Available

#Only production volume of OEM Model is reported by Maruti Suzuki India Limited

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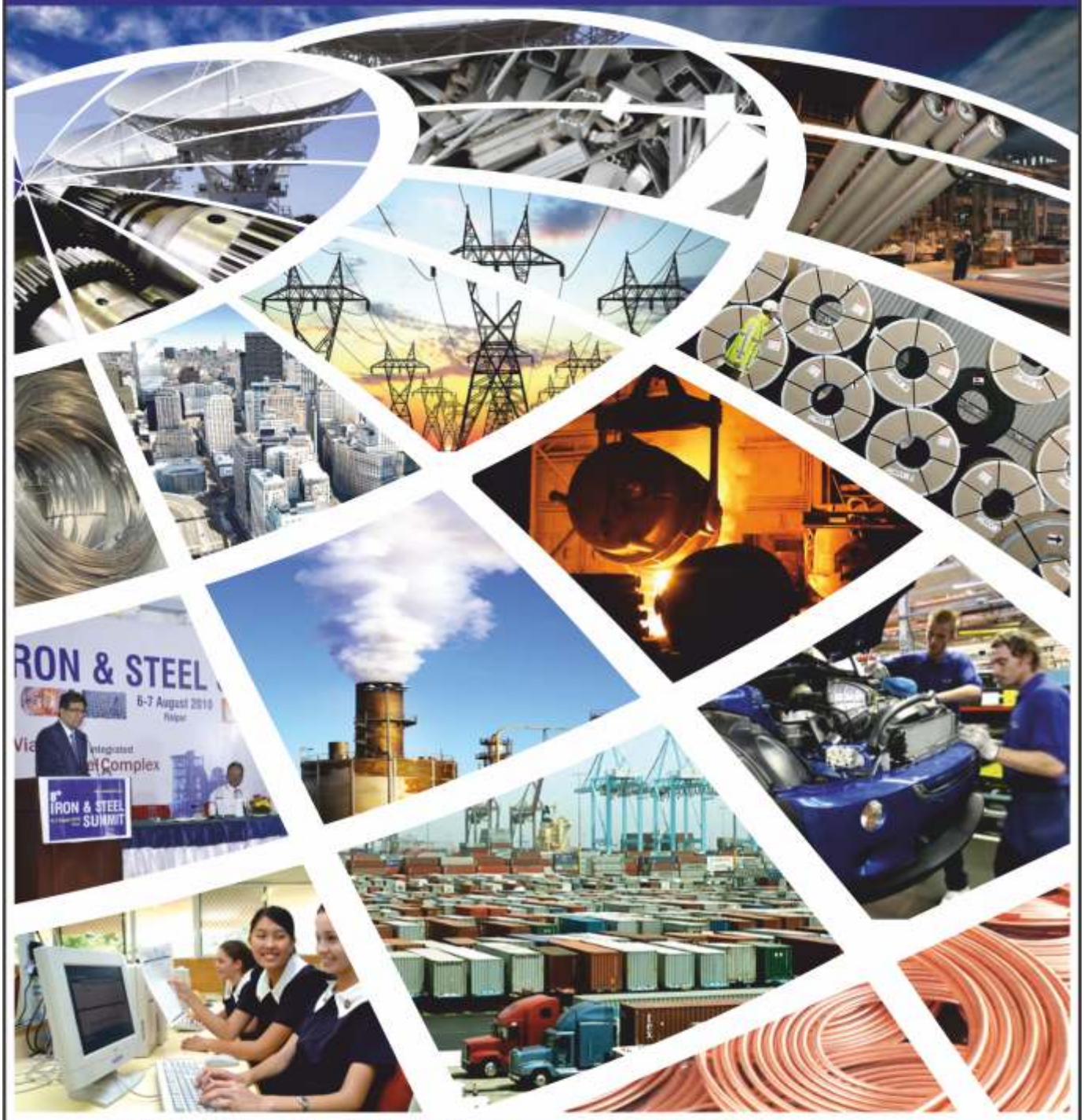

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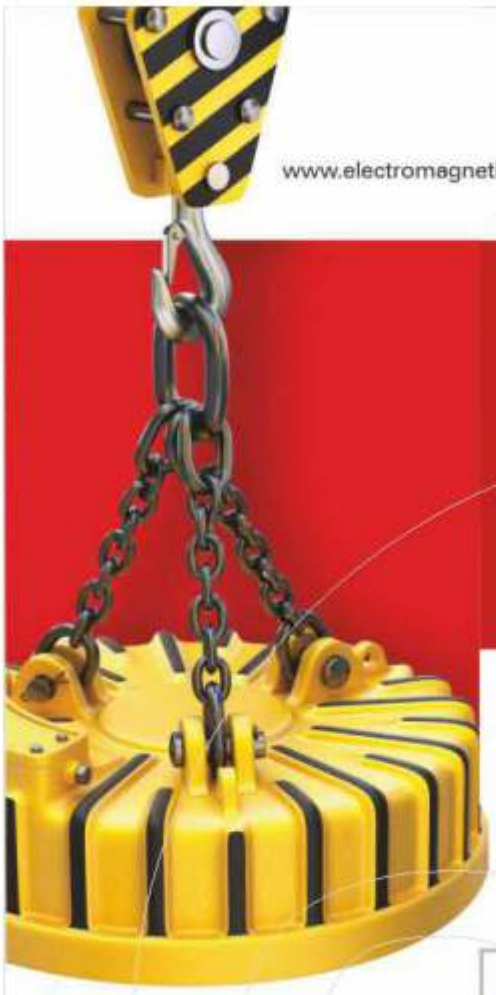

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