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Vol. 22 No. 05

May 2023

Registered-RNI No. MAHENG/2002/7908

www.metalworld.co.in



Subodh Panchal
Managing Partner
Kastwel Foundries



- Importance of interdisciplinary studies in metallurgy & material science- A study
- Innovation: The path to bolster sustainability in downstream aluminium industry
- Copper Nanoparticles in Dental Implant Applications

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D. A. Chandekar
Editor

Dear Readers,

The Indian metals industry is performing well in spite of the adverse conditions prevailing in most of the parts of the globe. The reason is obvious, it is domestic consumption which is and was always driving not only the metal and metal parts demand but also the national economy as a whole. I have also argued that with 140 crores of aspiring population, India is not likely to face recession. Today also I do not find any reason to deviate from this logic.

It is said that bad or rather challenging days are your best teachers. We all have gone through such a challenging period for the last three years or so. The covid 19 pandemic had really devastated not only families but also many businesses. Others somehow managed to survive using all their brains and the undying fighting spirit. During this survival journey, we have learnt many professional and management lessons. Cost and inventory control, working efficiency improvement, logistics optimization, employing new technologies, all these things we learnt and also practised during the pandemic period. Now the pandemic is over and the metals industry has in a way bounced back. My dear friends, my humble request is that let us not forget the lessons learnt

and continue practising them.

One area where we all have to work together is to improve our industry's image. I have seen many of my friends being proud of their association with IT or Auto industry but rarely I have seen somebody aspiring for a job or a career in metallurgical industry. Yes, ours was supposed to be a dirty industry offering jobs at add locations and in dusty hot environment. The salaries were far less than so called 'elite' sectors and thus 'Metallurgy' was undoubtedly the last choice of any engineering student. I know the things have changed a lot. Metallurgists no longer sit in hot iron cabin but have shifted to a decent AC control room. Many metal producing plants have excellent housekeeping and offer very clean and pleasant environment. The salary structure has also improved a lot over the years. Apart from the materialistic compensation, metallurgy is a core sector and it directly impacts the infrastructure growth and one would get a feeling of participating in nation building. Many prestigious industry sectors such as auto, railways, aerospace, power, defence etc. can not survive and grow without metals. Such is the importance of our sector.

I do agree that our industry now offers a bright growing career to a young engineer but the old perception about our industry still persists. We all have to work together to change it, isn't it ?

Write your comments :

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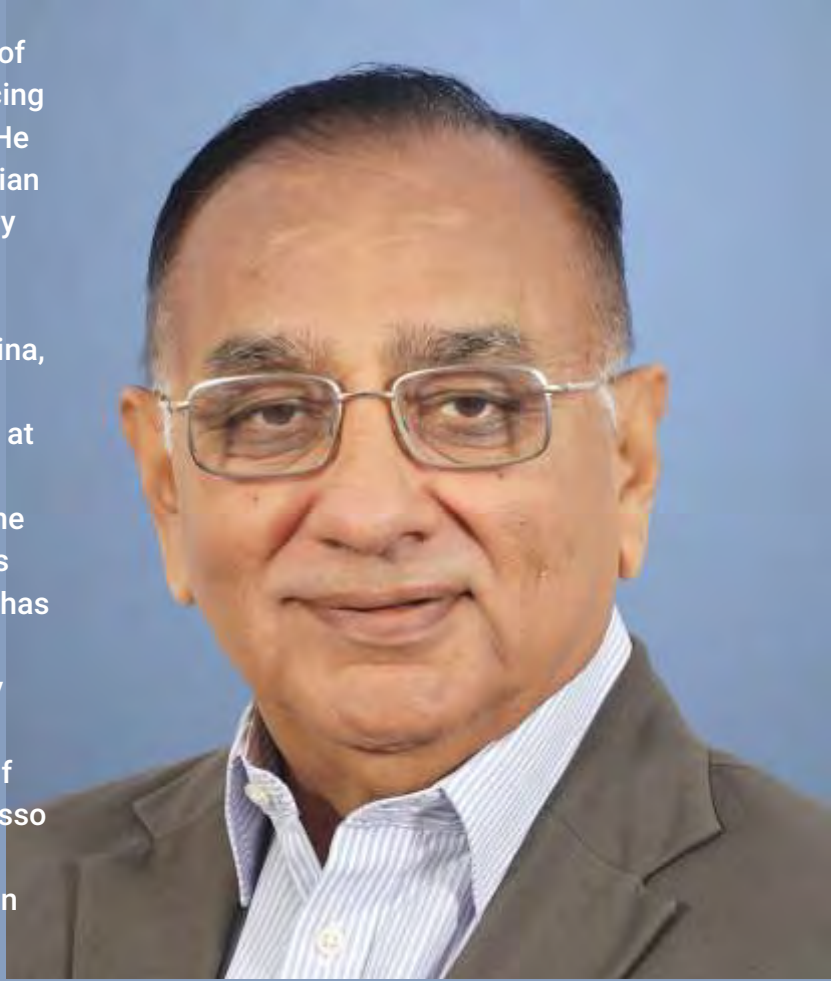
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Subodh Panchal is Managing Partner of Kastwel Foundries, Ahmedabad, producing Magnesium Master Alloys since 1974. He is Past President of The Institute Of Indian Foundrymen and has served the industry for more than five decades. He has organised participations of the IIF in international exhibitons in Germany, China, Turkey, repeatedly. He has also taken delegations and organised buyers meet at GIFA, Italy, Portugal, Russia, Korea, Pakistan and other countries. He became instrumental developing global contacts for Indian Foundrymen. In India also he has delivered many successful annual congresses and IFEX most successfully introducing Cast India Expo and many other new slots. He is council member of WFO, China Fdy Asso, BRICS Foundry Asso and Asia Foundry Forum. He is a successful businessman and well known Philanthropist.



D.A. Chandekar, Editor & CEO of Metalworld had an exclusive interaction with Subodh Panchal - Managing Partner of Kastwel Foundries, Past President of IIF. He spoke about the present situation in the Indian foundry industry, future of the Foundry Industry, what does the foundry industry need from the government, how to visit & how to participate in domestic as well as international trade exhibitions.

Excerpts:

1) What is the present status of the Indian Foundry Industry ?

Today Foundries all over India are doing extremely good & in future also this

trend will continue. If we look at the figures of last year i.e. 2021-2022 India produced about 12.44 million tonnes of castings which is about 10 YOY growth if we talk in terms of amount, Indian foundry industry has crossed 4 billion US dollar mark last year. Also this will continue in the coming couple of years. These figures are important to reflect the status of the industry.

1) How do you compare it with Chinese figures? Also tell us about the general environment in the industry?

It is nowhere comparable because China has reached about 40 million tonnes

whereas ours is 12.5 million but still we are growing. Because of the development project by the Government of India and Prime Minister, Mr. Modi, in infrastructure, railways, airports, there will be a boom in the demand of cement and steel industries, which will be percolated in the foundry industry also. Also there is demand for two wheelers , four wheelers and tractors, which are the main customer segments for the foundry industries. So I can say that the environment in the foundry sector seems to be good.

2) How do you see the future of the Foundry Industry, short term as well as long term?

Compared to China, we are far

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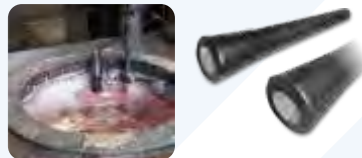
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Face to Face

behind. But, we are the second largest and we have lot of unexplored field to increase our volume. For example if we talk about GIFA, it is an event which takes place every four years at Dusseldorf, Germany. It will be from 12th June to 16th June. Now, if we have a look at the participants in GIFA from China and India, there are total 832 exhibitors out of which China is having 129, whereas India has only 72. In NEWCAST, which is a foundry fair it is exclusively for the foundry, Chinese foundry is 223, which is a large number. Against 223, India has only 35 foundries that are displaying there, so there is a vast difference. Still, India has increased in number so far as exhibitors are concerned, which was not seen in the previous two GIFA.

3) So you have been visiting and participating in GIFA since a really long time. What has been your experience? Today, if you see European economy is stagnated, in general. What is the purpose?

Yes, I'm visiting GIFA since 1984. I have seen the golden period of GIFA, where people from all over the world used to come to see the development in technology,

plus with the shopping list for expansion, etc. But as you rightly said, recently, Europe is also in a trouble, the economy is also not that



moving. And for that very purpose, GIFA which started in 1950. Now, the authorities have started to organise GIFA outside Germany. It was started in Bangkok 2 years back, now one more GIFA is going to take place in Bangkok this September. Then another new one they have also started in Egypt. They have announced which means they have realized the Europe economy is not very rosy. They are planning to go to the doors of the customers.

4) If Europe is

stagnated, then where can be the other export destination for Indian Foundries? Do you think MENA region, North Africa & Middle East or some other regions?

No, main buyer still will be US and Europe. Only thing, we have to plan to take a chunk of pie from the Chinese. China also has problems. They also have energy problems. And first time in many years, their bar of growth has shortened for engineering industries, foundry industry, etc. First time it has happened in last 10 years because of the shortage of energy. So we should be well planned. With proper planning and vision, we should try to get our share. If China is producing 40 million tons and we are producing 12 million tons, that means we

can at least have a growth of 50% more, taking away from the Chinese share. China is our competitor everywhere because they have certain plus points plus government policies which no other country can afford

5) What does the Foundry industry need from the government? Any policy changes or any support that they need from the government?

Well, if you ask me why China is competitive, because China



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is using average Rs 2 per unit power which they are getting from the government. Whereas in India it is from 8 to 10 rs per unit. So for this kind of labour oriented industry power is the main source of energy. In some states like in Maharashtra or other two more states, some reduction in power tariff is there if you operate in night so that should be made available uniformly everywhere, only then we can compete.

6) Sir, you are also a pioneer in organizing big fairs in India. What would you tell to the foundry sector? How to visit a fair or how to participate in a fair? Both Indian

or overseas fair. How should we look at these things?

See participating in any international fair does not mean you will come back with a bag full of orders. It will never happen, if you want to make your presence felt in international market you should definitely participate. But don't expect anything in return quickly. The advantage of this kind of fair is whatever the catalogues are published or whatever data is made available can give you the leads of the inquiries and this way you can have international benefit. Number two, there are two types of people which are going to visit. One are the visitors and second is the exhibitors themselves.

Both of them should study the website of the GIFA well in advance. It is such a large fair. One cannot expect they will visit every stand or every hall. There are about twelve halls. So you should do lot of homework before going to GIFA. As far as Indian exhibitions are concerned, it is more or less renewing your public relationship. Of course it helps because in new companies, young engineers join & so you can talk with them and develop the intimacy. So there should be a collective approach by the associations or the body which are taking care of the interests of the foundry men who invite the foreign speakers or invite the buyers, etc. This will give a big boost or satisfaction to the visitors and foundry men. ■

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Feature

Importance of interdisciplinary studies in metallurgy & material science- A study (Part-2)

Phase Diagrams have been an important tool in classical metallurgy. How is the development, validation and use of phase diagrams changing? Metallurgical phase diagrams are important tools in the study of the behavior of alloys. They show the relationship between temperature, composition, and the phases that are present in an alloy system. Computational thermodynamics is a method that is increasingly being used to predict and analyze phase diagrams for complex alloys.

Computational thermodynamics uses mathematical models and algorithms to predict the thermodynamic properties of materials, including phase stability and phase equilibria. This is achieved through the use of thermodynamic databases, which contain data on the Gibbs free energy of different phases and their composition dependence. The main steps involved in the computational thermodynamics approach to predicting phase diagrams are:

1. Define the system and input the relevant thermodynamic data: The system of interest is defined and the relevant thermodynamic data is inputted,

such as the Gibbs free energy of the different phases in the alloy system.

2. Calculate the thermodynamic properties of the system: The thermodynamic properties of the system are calculated using mathematical models and algorithms. This includes calculating the Gibbs free energy of the different phases and determining the composition of the phases that are present at different temperatures.
3. Generate the phase diagram: The phase diagram is generated by plotting the composition of the different phases against temperature. The phase diagram can be used to predict the behavior of the alloy system under different conditions, such as during heating or cooling, or during the processing of the alloy.

The use of computational thermodynamics for predicting phase diagrams has several advantages over experimental methods,

including:

- Reduced time and cost: Computational thermodynamics can save time and cost compared to experimental methods, as it eliminates the need for extensive experimentation and testing.
- Improved accuracy: Computational thermodynamics can provide more accurate predictions of phase behavior compared to experimental methods, as it takes into account the full range of thermodynamic data.
- Ability to predict behavior of complex systems: Computational thermodynamics can be used to predict the behavior of complex alloy systems that would be difficult or impossible to study experimentally.

Computational thermodynamics is a powerful tool for predicting and analyzing metallurgical phase diagrams. It provides accurate predictions of phase behavior, saves time and cost, and allows for the study of complex systems.

Another facet of metallurgical processes is difficulties in reaching true chemical and



Sadguru Kulkarni

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Feature

thermodynamic equilibrium. This is on account of the necessary use of high temperature processes, difficulties in movement of materials/ phases during solidification, etc. This often leaves residual stresses in the metallurgical products.

processing, such as during melting, casting, and solidification.

Non-equilibrium thermodynamics is characterized by the presence of gradients, such as temperature, composition, and velocity, which drive the



Such situations are non-equilibrium processes and materials. Metallurgical processes reach real equilibrium over a long time as compared with chemical processes, and many non-equilibrium structures are common in metals processing. Thus non-equilibrium thermodynamics is important in the study of metals.

Non-equilibrium thermodynamics is an important concept in process metallurgy as it describes the behavior of materials and systems that are not in thermodynamic equilibrium. In process metallurgy, non-equilibrium thermodynamics is used to understand and control the behavior of materials during

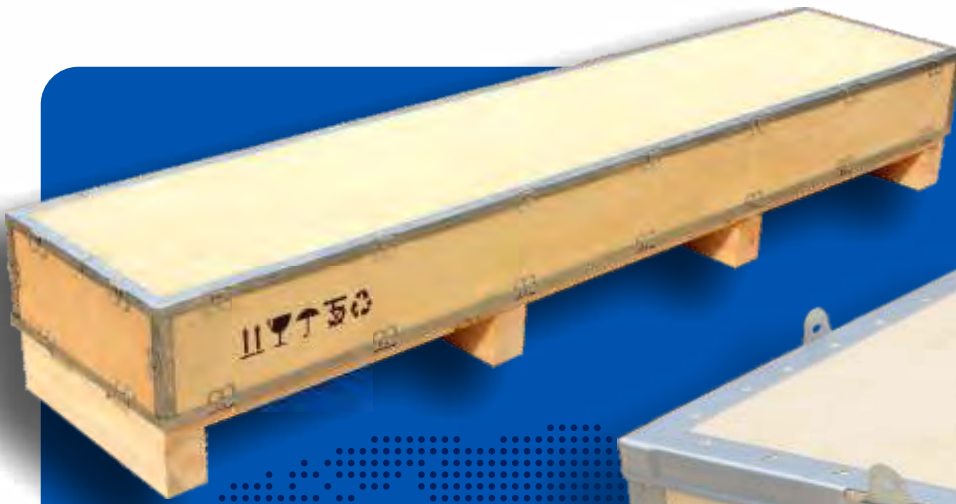
system towards a state of thermodynamic equilibrium. However, the system may not have enough time to reach equilibrium due to the fast processing times involved in metallurgical processes. As a result, the material may exhibit non-equilibrium behavior, such as metastable phases, undercooled liquids, and nonequilibrium solid solutions.

Here are some examples of how non-equilibrium thermodynamics is used in process metallurgy:

1. Solidification: During solidification, the cooling rate of the melt can affect the crystal structure and phase transformation of

the solid material. Non-equilibrium thermodynamics can be used to predict the nucleation and growth of crystals, as well as the formation of metastable phases.

2. Rapid solidification: Rapid solidification involves cooling the melt at a very high rate, leading to the formation of non-equilibrium structures, such as amorphous alloys or nanocrystalline metals. Non-equilibrium thermodynamics is used to predict the formation of these structures and their properties.
3. Powder metallurgy: Powder metallurgy involves the formation of metal powders through mechanical or chemical methods. Non-equilibrium thermodynamics is used to predict the behavior of the powder during sintering, which involves heating the powder to form a solid material. The kinetics of sintering can affect the final properties of the material, such as density and microstructure.
4. Surface phenomena: Non-equilibrium thermodynamics can be used to study surface phenomena in metallurgical processes, such as adsorption and desorption of species



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Feature

at the surface of a melt or solid. This is important for controlling the quality of the final product, such as the formation of oxide layers on the surface of a metal.

Thus non-equilibrium thermodynamics is an important concept in process metallurgy, as it helps to predict and control the behavior of materials during processing. It is used to study phenomena such as solidification, rapid solidification, powder metallurgy, and surface phenomena, and is essential for designing and optimizing metallurgical processes.

Metals for use in electronics: Electronic industry hardware is strongly dependent on non-ferrous metals. With the ever increasing importance of the electronics hardware, it is constantly evolving, and new materials with unique properties are required to meet the demands of emerging technologies. Low volume metals are a class of materials that are being investigated for use in the electronics industry due to their unique properties. These metals have a lower production volume than traditional metals like copper, aluminum, and gold, but they offer advantages such as improved electrical conductivity, thermal stability, and corrosion resistance.

Here are some examples of new low volume metals that



are being investigated for use in the electronics industry:

1. Tantalum: Tantalum is a low volume metal that has excellent electrical conductivity, high melting point, and good corrosion resistance. It is being studied for use in electronic components such as capacitors and transistors due to its ability to store electrical charge.
2. Indium: Indium is a low volume metal that has good electrical conductivity and is used in the production of touch screens, liquid crystal displays (LCDs), and solar cells. It has unique optical and electrical properties that make it useful for these applications.
3. Gallium: Gallium is a low volume metal that has a low melting point and excellent thermal stability. It is used in the production of semiconductors and electronic components due to its ability to conduct heat and electricity.
4. Beryllium: Beryllium is a low volume metal that has a very high melting point and excellent thermal conductivity. It is used in the production of electronic components such as X-ray windows, radiation detectors, and microwave devices.
5. Ruthenium: Ruthenium is a low volume metal that has excellent corrosion resistance and is used in the production of hard disk drives and other data storage devices. It has unique magnetic properties that make it



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Feature

useful for these applications.

Thus low volume metals are being investigated for use in the electronics industry due to their unique properties, such as improved electrical conductivity, thermal stability, and corrosion resistance. Tantalum, indium, gallium, beryllium, and ruthenium are examples of low volume metals that are being studied for use in electronic components and devices. As new technologies emerge, the demand for new materials with unique properties will continue to grow, and low volume metals are one area of research that may yield promising results for the electronics industry. It is interesting to observe that lithium- the most important

optical properties. Soft solids are materials that have a low modulus of elasticity, meaning they can be deformed easily under stress, but can also recover their original shape when the stress is removed. Examples of soft solids include hydrogels, elastomers, and liquid crystals.

Here are some ways soft solids technology is being used to develop new materials:

1. Smart materials: Soft solids can be engineered to respond to stimuli such as temperature, pH, and light. By incorporating responsive molecules into soft materials, scientists

solids can be used to fabricate flexible and stretchable electronics that conform to the human body. By incorporating conductive polymers and other functional materials into soft solids, scientists can create electronic devices that can be worn on the skin or integrated into clothing. Examples of wearable electronics include smart watches, fitness trackers, and health monitors.

3. Soft robotics: Soft solids can be used to create robots and other mechanical devices that are soft and flexible. Soft robotics has potential applications in areas such as healthcare, where soft robots could be used to manipulate delicate tissues and organs without causing damage. Soft robots could also be used in manufacturing and other industries where traditional rigid robots are not suitable.

4. Energy harvesting: Soft solids can be used to harvest energy from mechanical and thermal sources. By incorporating piezoelectric and thermoelectric materials into soft solids, scientists can create materials that generate electricity in



battery material and present in every electronic gadget, does not appear in this list. We understand that this may be on account of the semantics of the question, and it may appear strongly in energy storage.

Soft solids technology is an emerging area of materials science that focuses on designing and synthesizing soft materials with unique mechanical, electrical, and

can create smart materials that change their properties in response to their environment. These materials have potential applications in areas such as drug delivery, sensing, and actuation.

2. Wearable electronics: Soft

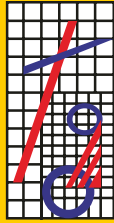
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Feature



response to mechanical and thermal stimuli. These materials have potential applications in areas such as energy harvesting from body motion and waste heat recovery.

5. **Biocompatible materials:** The rapidly evolving field of biomedical devices and related developments in medical/ surgery requires materials, which are compatible with the human body. Such materials are often 'soft solids' incl. Films, gels, cartilages etc. Silicones, and biocompatible polymers, carbon, as well as special alloys of materials like titanium offer scope for such applications.

Thus, soft solids technology is an emerging area of materials science that is being used to develop new

materials with unique properties and functions. Smart materials, wearable electronics, soft robotics, and energy harvesting are some of the areas where soft solids technology is having an impact. As this field continues to develop, we can expect to see even more innovative applications of soft solids in areas such as healthcare, energy, and manufacturing.

Biotechnology in metallurgy & material processing: Bioprocessing has been a high potential area that has penetrated into other disciplines over the last fifty years. How has it affected metallurgy and material science?

Biotechnology can play a significant role in metallurgy and material science, particularly in the development of new materials and the improvement of existing ones. Here are some specific ways in which biotechnology can be used in these fields:

1. **Biomineralization:** Biomineralization is the process by which living organisms produce

minerals, such as the formation of bones and shells.

Biotechnology can be used to study the mechanisms behind this process, which can lead to the development of new methods for synthesizing and processing minerals.

2. **Bioleaching:** Bioleaching is a process in which microorganisms are used to extract metals from ores. Biotechnology can be used to optimize this process by identifying and modifying microorganisms to improve their metal extraction efficiency.
3. **Biocorrosion:** Biocorrosion is a process in which microorganisms accelerate the corrosion of metals. Biotechnology can be used to study the mechanisms behind this process, which can lead to the development of new materials that are resistant to biocorrosion.
4. **Biocomposites:** Biocomposites are materials that are made by combining natural fibers and matrices. Biotechnology can be used to modify the properties of natural fibers and matrices to improve the strength,

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durability, and other properties of biocomposites.

5. Biomaterials: Biomaterials are materials that are used in medical implants, such as artificial joints and heart valves. Biotechnology can be used to develop new biomaterials that are biocompatible, durable, and capable of promoting tissue regeneration.

Overall, the use of biotechnology in metallurgy and material science has the potential to revolutionize these fields and lead to the development of new and improved materials with a wide range of applications.

AI (Artificial Intelligence) and ML (Machine Learning) are being increasingly applied in metallurgy to improve materials design and process optimization. Here are some examples of how AI and ML are being used in metallurgy:

1. Materials design: AI and ML are being used to develop new materials with improved properties. By analyzing large datasets of materials properties and structures, scientists can use machine learning algorithms to predict new

materials with specific properties. This approach can be used to develop materials with improved strength, corrosion resistance, and other desirable properties.

2. Process optimization: AI and ML are being used to optimize manufacturing processes in metallurgy. By analyzing data from sensors and other sources, machine learning algorithms can identify patterns and optimize process parameters to improve efficiency and reduce waste. This approach can be used to optimize processes such as casting, rolling, and heat treatment.
3. Quality control: AI and ML are being used to improve quality control in metallurgy. By analyzing data from sensors and other sources, machine learning algorithms can identify defects and predict quality issues before they occur. This approach can be used to improve quality control in processes such as casting, forging, and welding.
4. Predictive maintenance: AI and

ML are being used to improve maintenance of equipment in metallurgy. By analyzing data from sensors and other sources, machine learning algorithms can predict when equipment will fail and recommend maintenance actions to prevent downtime. This approach can be used to improve the reliability and uptime of equipment in metallurgy.

5. Data analytics: AI and ML are being used to analyze large datasets in metallurgy. By analyzing data from sensors, simulations, and other sources, machine learning algorithms can identify patterns and trends that would be difficult to detect using traditional statistical methods. This approach can be used to identify new materials, optimize processes, and improve quality control.

Thus, AI and ML are being used in metallurgy to improve materials design, process optimization, quality control, predictive maintenance, and data analytics. As these technologies continue to advance, we can expect to see even more innovative applications in metallurgy and other fields. ■



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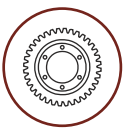


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Innovation: The path to bolster sustainability in downstream aluminium industry

Jindal Aluminium is the country's largest aluminium extrusion company, with about 30 per cent share having legacy spans over 50 years. It was founded by Dr. Sitaram Jindal in 1968, Jindal Aluminium is a pioneer in the manufacturing of Aluminium products. With state-of-the-art facility and expertise in manufacturing intricate Aluminium profiles, it is the largest producer of Aluminium extruded and the second-largest producer of Aluminium flat-rolled products in India. The company believes in building an enriched society brought about by innovation and excellence in the

manufacturing of Aluminium products.

It is the first Indian Aluminium extrusion company with Hartford Steam Boiler (HSB) and ISO 9002 certification (currently revalidated as per IS/ISO 9001:2015). It is also certified by the American Bureau of Shipping (ABS) for marine applications. It has a total manufacturing capacity of over 1.75 lakh metric tons per annum, including 1.25 L metric tons per annum of Aluminium extruded and 50,000 metric tons per annum of Aluminium flat-rolled products. It exports to countries like the UK, US, Canada, Australia, Middle-



Pragun Jindal Khaitan,
Vice Chairman and Managing Director, Jindal Aluminium Ltd.

East nations, and others.

The company's core business is manufacturing of aluminium extrusions and aluminium flat rolled products. Installed production capacity of Flat Rolled Products is 50,000 MTs and 1,20,000 MTs for Extruded Products. The 11 extrusion presses represent different capacities ranging from 750 tons to 4000 tons, with an installed production capacity of 1,25,000 MT per annum. Backed with a log casting foundry capable of producing 1,40,000 MT per annum, a most modern in-house die making tool shop capable of producing high quality and intricate dies of international standards, we are

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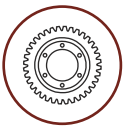


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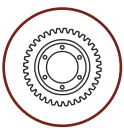
a fully self-sufficient manufacturer. As global concern over climate change deepens, the industry is aggressively pursuing new solutions to decarbonise, meet their emission reduction objectives, and reduce energy costs. The efforts of the aluminium sector to minimise carbon emissions have an immediate and substantial effect on reducing global greenhouse gas emissions. This has far-reaching ramifications for a variety of businesses and is an efficient means of combating the adverse effects of climate change. The increased interest in aluminium as a critical material for emission-reducing solutions such as electric automobiles and energy-efficient buildings is very encouraging. Aluminium has been utilised for a wide range of applications, including electrical transmission lines, defence, and building, but its potential as a green metal is truly astonishing. Aluminium is one of the most environmentally friendly materials available today due to its outstanding durability and recyclability. In fact, it is one of the most recyclable industrial materials and can be continuously recycled into the same product. This means that recycling can conserve up to 95% of the energy required to create aluminium from its virgin source. As we work towards a more sustainable future,

the adaptability and environmental benefits of aluminium make it a great asset for a variety of businesses. Our quest for a material that is sustainable, environmentally clean and ready for the future, has been answered by aluminium. As it caters to diverse industrial needs, aluminium emerges as a valuable metal that holds immense strategic significance for economic progress and sustainability. Its application in various industrial needs presents a unique opportunity for developing a circular economy, without having to compromise on progress. Even cutting-edge devices such as laptops are made from recycled aluminium, thanks to its recyclability, light weight, ductility, electrical conductivity, and resistance to corrosion. A metal that can be continuously recycled and reused can only be put to sustainable use through innovation. A prime example of this is the manufacturing of aircraft, where the innovative use of aluminium for aircraft wings, smooth rivets, and even seats has led to reduced weight, increased range, and reduced fuel consumption. All the while, safety remains the top priority, and sustainability is achieved with the manufacturing of such product. Pragnu Jindal Khaitan was born on August 9, 1992, in Mumbai, Maharashtra, India, to Sushil Khaitan and Asha Jindal Khaitan. His maternal

grandfather, Dr. Sitaram Jindal, is a renowned Indian industrialist and philanthropist who was one of the founders of the Jindal Group of Industries. He individually founded Jindal Aluminium (JAL) back in 1968 and subsequently Jindal Naturecure Institute in 1976. Pragnu's father, Sushil Khaitan, a renowned name in the Indian nutraceutical space, is the director of Pure Nutrition. Pragnu is married to Sukriti Jindal Khaitan, daughter of Sanjay Kothari who is Vice Chairman and the fourth generation of the founding family of the global



diamonds & gemstones giant, KGK Group. As a child, Pragnu completed his higher secondary education from Sevenoaks School, UK. He later went to the US for higher studies and completed his bachelor's degree in Economics, at Wharton Business School from the University of Pennsylvania. Before joining Jindal Aluminium, Pragnu had worked towards setting up the Trivandrum branch of the world's pioneering microfinance institution, Grameen Bank, during his internship in the year 2009. With his keen interest, passion



Industry Update

to excel and a sense of responsibility, Pragun joined Jindal Aluminium as its whole-time Director in the year 2013. Under his leadership, the parent company grew at an attractive average annual rate of 25 percent between 2013-2017. Also, in this time, he successfully stabilized production at JAL's aluminium flat rolled product's plant, taking it from inception to being the second largest supplier of aluminium flat rolled products in India within a span of 4 years. During this time, he also restructured



the management team of the various businesses and brought in outside talent to fill in the new positions that he created.

Seeing these achievements, he was subsequently promoted to the position of Managing Director in 2017. In the year 2020, he was given the additional responsibility of vice-chairman of the company. Average of 11kg per capita, the demand for the metal is set to take off. Pragun has grown up with the belief that one needs to give back to society, a large portion of what one has earned. As such social service is not only a key activity of his career but is

also a core guiding philosophy that he embraces in how he approaches his business. For him, education and awareness are the root causes of the majority of social issues prevailing today in our country and he places great emphasis in his personal capacity to aiding institutions that work towards improving this. He feels that global warming and women rights are the two most neglected social issues that need attention today and hopes to take this up in the coming years.

He is a philanthropist by nature and is providing financial aid to several charities in his personal capacity as well. He is also actively participating in the humanitarian work through various Trusts/Societies and Institutions of which he is a Trustee and Patron. He has taken a keen interest in the charitable activities of Sitaram Jindal Foundation (SJF) – of which he is Chairman – and helped in identifying several worthy causes which were supported by SJF.

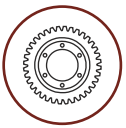
Since his childhood, Pragun has nursed his interests passionately. He has always been an avid movie-goer. His particular taste lies in action/thriller movies. He is also a voracious reader, inclined to read biographies and books that show him a different perspective on the world. One of his favorite books is "Maverick" by Ricardo

Semler. He loves safaris and any travel that brings him closer to nature. He has also learned from his grandfather, Sitaram Jindal, on the importance of adopting a natural and healthy lifestyle – and thus takes great pains to eat clean and workout daily. During his free time, Pragun prefers to spend time with his family and close friends but you can often find him researching on the latest technologies and global developments that can help make the world a better and more fulfilling place to live.

Key to sustainability

Aluminium has assimilated into our contemporary culture. It is present everywhere; from our smartphones and the aircraft we fly in to our homes and places of employment or worship. You might even be reading this on a computer or other device with an aluminium body, demonstrating how important it is to our daily life. Tablets, computers, flat-screen televisions, sporting goods, furniture, mirrors, coffee makers—the list of things that may be made out of aluminium is boundless. Cans, foil, kitchenware, window frames, beer kegs, and electric vehicles or aircraft parts are just some of the many high-quality products that make use of this material today.

These examples highlight the growing importance of aluminium, a sustainable and infinitely recyclable metal, in contemporary society. The downstream aluminium sector has expanded to meet rising demand as a result of the metal's widespread application. As our economies develop and our living



Industry Update

standards improve, an increase in the demand for aluminium & the utility in various applications will skyrocket further.

Innovation is the first step towards creating a sustainable future. To give long-term social and environmental gains while simultaneously creating economic returns for the organisation, sustainable innovation has evolved beyond its original definition as the deliberate alteration of a company's products, services, or processes.

The downstream aluminium industry is committed to implementing smart, innovative practices across a range of areas including safety, productivity, digital manufacturing innovation (product/process), green manufacturing, machining excellence, quality control, human resources, corporate social responsibility, supply chain management, and maintenance. This is in order to optimize operational efficiencies and maintain one of the lowest carbon footprints in the world.

Leveraging data analytics
Data integration and analysis will help the industry boost output and quality. One of the great benefits of data analytics is that it can transform vital information into formats that are engaging, and which can be easily interpreted in making decisions. This is extremely important in the massive aluminium industry because it allows data that was previously disregarded

or forgotten to be considered. Digital transformation has set the way for the hyper-connected factory of tomorrow.

Manufacturing Execution Systems (MES) have emerged as critical enablers of digital transformation. When it comes to adopting digital transformation projects, aluminium extrusion producers confront a number of challenges. The reliance on legacy systems, which are not necessarily compatible with modern digital technology, is a serious concern. Upgrades to existing systems can be costly and time-consuming, delaying the introduction of new digital solutions. Furthermore, the use of digital technologies generates vast volumes of data that must be managed and analysed.

Manufacturers must create effective data management systems to guarantee that data is collected, kept, and analysed effectively in order to gain significant insights. Moreover, labour upskilling and supply chain integration are crucial issues to consider in order to achieve a seamless and effective transition to digital transformation. Overcoming these problems, in general, necessitates a comprehensive plan that tackles all components of the digital transformation process, including technological, organisational, and cultural aspects.

With the quick rate of digital transformation, there has never been a better time to

create a hyper-connected digital experience capable of benchmarking production line outputs by improving process flows, productivity, and efficiencies. Hyperconnectivity, which is going to be a revolutionary business trend, will enable manufacturers to respond more quickly to any process delays that may occur along the route.

Application-based development

The aluminium industry has emerged as a leader in environmentally friendly metals, with a strong focus on recycling and reuse in the downstream sector. Furthermore, traditional fuels like coal and diesel are gradually being replaced with renewable energy sources like solar and wind. Through automation and waste minimisation, manufacturing processes have been transformed, resulting in a significant reduction in the carbon footprint of the industry.

With its strong capabilities in research and development, technical skills, and centres of excellence, the downstream aluminium industry has developed extremely marketable products using new approaches. The downstream aluminium sector has advanced innovation by focusing application-based development, such as making tailored wire rods for coastal electrical markets or crash-resistant alloys for electric vehicles. This dedication to innovation and exploration sets the downstream aluminium industry for future success. ■

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Copper Nanoparticles in Dental Implant Applications

Copper plays a crucial role in the metal industry due to its unique properties and versatile applications. Here are some key reasons why copper is important in the metal industry: Due to its excellent conductivity, it is in high demand in electricity for wiring, power transmission and distribution and in electronics. Due to exceptional thermal conductivity makes it an ideal choice for heat exchangers, heat sinks etc. Because of its excellent corrosion resistance it is in demand for plumbing systems and water supply networks. Copper is malleable and ductile, so it can be used in pipes, tubes, wires and other fabricated products required in different industries. Antimicrobial property makes copper very special in healthcare, food processing and in the prevention of spread of pathogens. Copper is often used as a base metal in the production of various alloys, such as bronze (copper and tin) and brass (copper and zinc). These alloys offer enhanced properties and find applications in diverse industries, including manufacturing, automotive, aerospace, construction, and telecommunications. Overall, the importance of copper in the metal industry

stems from its unique combination of properties, making it an essential material for numerous applications that contribute to modern infrastructure, technology, and everyday life.

Copper nanoparticles, are tiny particles of copper with dimensions typically in the range of 1-100 nanometers. Nanocopper has gained significant attention in various industries due to its unique properties and potential applications. Here are some key areas where nanocopper finds importance in the industry. Dental implants serve as artificial tooth roots to replace missing teeth. Typically, they are crafted from biocompatible materials such as titanium or titanium alloys, which exhibit a high success rate and compatibility with the human body. The success of osseointegration, the bonding of the implant with the surrounding bone, is influenced by both mechanical designs and surface topographies. Besides mechanical stability, factors like biocompatibility and resistance to microbial attacks play a vital role in ensuring integration and preventing implant failures. Some of the commonly studied metal NPs in dental implant research include

silver, gold, zinc, and copper. Copper nanoparticles can be incorporated into the structure of implant materials to enhance their mechanical properties. This includes improved strength, durability, and resistance to wear and corrosion. Reinforcing implant materials with nanocopper may lead to longer-lasting and more reliable dental implants. Chemically pure titanium (Cp-Ti), although corrosion-resistant, is relatively softer and exhibits poor mechanical properties, making it less favorable for dental implants. As a result, Ti-6Al-4V alloy, containing titanium and other elements, is widely utilized to enhance the implants' mechanical strength. Copper (Cu) has not been extensively employed in dental implant alloys; however, there are ongoing studies exploring the application of Cu nanoparticle coatings to impart antimicrobial properties. These studies aim to improve the overall performance and longevity of dental implants by reducing the risk of infection and enhancing biocompatibility. The primary complication associated with dental implants is peri-implantitis, an inflammatory condition that affects the surrounding soft and hard tissues of the implant. This condition is commonly caused by bacterial infections. Advancements in surface treatments using



Ramesh Chaughule
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Ramnarain Ruia
Autonomous College



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Department of Dentistry,
Bhabha Atomic
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Hospital



additive or subtractive techniques have allowed for increased bone-implant contact, accelerated loading protocols, and reduced early failures. However, some researchers have hypothesized that these novel surfaces, with their enhanced wettability, may also lead to increased bacterial adhesion and a higher risk of peri-implantitis.

While the main objective of surface treatments is to improve surface energy for better wettability and promote the attraction of osteoblastic cells for bone formation, it is equally important to counteract bacterial influx and limit infections. This can be achieved through the utilization of bactericidal or bacteriostatic coatings, thus ensuring a balance between enhancing osseointegration and mitigating the risk of peri-implantitis.

Copper nanoparticles have been found to be effective against a wide range of bacteria, including those commonly associated with peri-implantitis. It is a common disease caused by bacterial colonization on dental implants, which can lead to implant failure. In addition, Cu NPs have been found to have anti-inflammatory properties, which may help to reduce the severity of peri-implantitis. Studies have shown that incorporating copper nanoparticles into the surface of dental



Analysis

implants can reduce bacterial colonization and biofilm formation, which are major factors in the development of peri-implantitis. Furthermore, Cu NPs have been shown to enhance osseointegration, the process by which the implant fuses with the surrounding bone. They can stimulate osteoblast activity and increase the production of bone matrix proteins, leading to increased bone growth around the implant. Antibiotic treatment may be necessary to control the bacterial infection, but it may not always be effective, especially against antibiotic-resistant bacterial strains. Therefore, researchers have investigated the use of copper as an antibacterial element in titanium alloys to reduce bacterial colonization and prevent implant failure. Studies have shown that Cu-Ti alloys can effectively reduce bacterial colonization, and this antibacterial effect is attributed to the release of Cu ions from the alloys. The Cu ions can participate in Fenton reactions to generate reactive oxygen species (ROS), which can inhibit bacterial replication and lead to bacterial death. However, it is important to carefully design the Cu dosage in the alloys to avoid toxicity issues. The ability of copper to donate and accept electrons in a continuous process is responsible for its bactericidal action. The generally accepted

mechanism of inhibition of bacteria by copper NPs is rupture of the negatively charged bacterial cell wall, protein degeneration, and finally cell death due to the release of copper ions from the metallic NPs. Thus by developing Cu-Ti alloys with optimal Cu dosage, researchers can create biomaterials with antibacterial properties, appropriate hardness, and corrosion resistance, which can reduce the risk of peri-implantitis and improve the longevity of dental implants. Overall, the mechanism of action of Cu NPs in dental implants involves their antibacterial properties, their ability to modulate the immune response, and their potential to enhance osseointegration. These properties make Cu NPs a promising material for improving the long-term success of dental implant treatments

Chatterjee *et al.* reported that treatment of *E. coli* cells with copper NPs led to overproduction of reactive oxygen species in the bacterial cells, which increased lipid peroxidation, protein oxidation, and DNA degradation, finally culminating in cell death. Thus, based on the literature and the findings of the present study, copper NPs appear to have potential in the prevention and treatment of periodontitis.

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Gargi HA receives 35th Jamnalal Bajaj Award for Fair Business Practice 2023



Gargi HA has received a 35th Jamnalal Bajaj Award for Fair Business Practice 2023 as a recognition of our commitment to fairness and ethical practices.

Gargi HA is an Indian arm of the parent company HA Group, Germany.

It is a joint venture between Gargi and Hüttenes-Albertus Chemische Werke GmbH.

Gargi HA is a renowned foundry chemicals manufacturer and supplier.

The Council for Fair Business Practices was launched on the Gandhi Jayanti Day in 1966 by stalwarts of business and Industry of that era, such as JRD Tata, Ramkrishna Bajaj and others. CFBP instituted the prestigious Jamnalal Bajaj Fair Business Practices Awards since 1988 to recognize and applaud the efforts of businessmen, business houses and business associates with an exemplary record of practicing and promoting Fair Business Practices.

Gargi HA is a renowned foundry chemicals manufacturer and supplier. The Council for Fair Business Practices was launched on the Gandhi Jayanti Day in 1966 by stalwarts of business and Industry of that era, such as JRD Tata, Ramkrishna Bajaj and others. CFBP instituted the prestigious Jamnalal Bajaj Fair Business Practices Awards since 1988 to recognize and applaud the efforts of businessmen, business houses and business associates with an exemplary record of practicing and promoting Fair Business Practices.

They have received this awards from Mr. Keki Mistry (Vice Chairman and CEO, HDFC LTD), Justice B.N .Srikrishna, Former Judge ,Supreme Court of India and Mr. Shekhar Bajaj (Chairman & MD, Bajaj Electrical LTD). Since 1985, Gargi HA has persistently maintained its notable presence in the foundry industry by providing unrivaled foundry chemicals and commendable consumer service, both globally and nationally. They strive and work with utmost dedication to maintain high ethical standards in the business. Not only do take care of their



customers and stakeholders' satisfaction, but also, they take care of their employees. They abide by the law and explore innovations and technologies to maintain transparency and a safer workspace.

Their values spin around excellent customer retention ratio, sustainable business practices, gender equality, a conflict-free work environment, progressive management, customer satisfaction, giving back to society, and more.

It is a great motivation for them to continue to uphold the highest standards of fairness and honesty in our business practices.

They proudly say that Gargi HA strive to maintain the highest level of integrity and ethical standards in all their business dealings and want to be the most innovative company in the foundry industry in delivering superior customer value.

Gargi HA has always believed in winning the race today, while running the race for tomorrow...!



News Update

Global Steel crude production dropped by 2.4 percent in April 2023 as compared with last April

April world crude steel production in the 63 countries reporting to the Brussels-based World Steel Association (Worldsteel) dropped 2.4 percent compared with last April. Year to date, global output now has fallen 0.4 percent behind last year's pace.

Worldsteel says the 161.4 million metric tons of production this April was led by China, which at 92.6 million metric tons of output represented more than 57 percent of steel made globally.

Among the 10 largest steel-producing nations in April, only three made more steel than it had one year ago (and one of those just barely). China's output rose 4.1 percent year on year and India's output rose 3.0 percent. Mills in Iran, meanwhile, were just above the breakeven point with a 0.1 percent increase.

Of the seven nations with production declines, Turkey's was most severe, with a 21.3 percent drop. Turkey typically is the leading export destination for ferrous scrap leaving the United States. Steelmakers in Brazil made 8.8 percent less steel this April compared with last April while output in Germany dropped 5.8 percent year on year.

Nations with less severe drops include: Japan (-5.3 percent), the United States (-4.1 percent), Russia (-0.6 percent) and South Korea (-0.4 percent).

Despite the less-than-stellar April figures, in its most recent short-range outlook, Worldsteel has forecast a 2.3 percent rebound in global steel demand this year (though not necessarily output), followed by another 1.7 percent demand increase in 2024.

Hindalco plans ₹5,000 crore capex for FY24

crore capex in this fiscal against ₹3,000 crore spent last year even while putting off its \$350 million capex in China.

The company, which intends to spend a similar capex next fiscal year, will fund the entire investments through internal accruals and will not raise any debt.

Satish Pai, Managing Director, Hindalco Industries said the major part of the capex will go for the ongoing expansion at Aditya Mahan smelter by 50,000 tonnes and rolling mill capacity at Hirakud besides developing the Chakla coal mine.

The capex in China was put-off due to the ongoing trade tussle between the US and China, while Novelis investment of \$1.8 billion in the US, Brazil, and Korea will continue.

While the company expects LME prices to fluctuate between \$2,200-\$2,400 a tonne for the next two quarters,

the EBITDA per tonne will increase due to lower input costs. The coal prices have settled lower with good supply and other input cost are also inching down, he said.

The benefit of the increase in TcRc (treatment and refining charges) rates to 20 cents from 16.7 cents in copper business will start reflecting from June quarter, he added

The demand in India for aluminium and copper is so strong that the company is short of capacity, said Pai adding that the 34,000-tonne per annum extrusion plant at Silvassa will go on stream in the next few days catering to the growing domestic demand.

The pace of Chinese economic recovery and cheap aluminium scrap imports remains the major concern in the domestic market. After the series of rate hikes, the US Fed should start cutting interest in the second half of this year to bolster their economy, he said.

The company has recently received green Aluminium certification for 8 per cent of production at Aditya Mahan as 8 percent of power used in the smelter was through solar energy. With the use of more solar power supplied by its green energy partner, Greenko, Hindalco intends to convert 30 percent of its production into low carbon aluminium over 3-4 years.

Though there is no big premium for green aluminium as of now, there are few customers, especially in Europe, who buy only green aluminium, said Pai.

Global copper smelting slides to two-year low in April, satellite : Reuters data show

Global copper smelting activity slid in April to the lowest level in two years as Chinese operations shut for maintenance and plants in North America slowed down, data from satellite surveillance of metal processing plants showed on Friday.

In Central Asia, smelters in Turkey and Kazakhstan were inactive at the end of the month, commodities broker Marex and the SAVANT satellite service said in a statement.

Earth-i, which specialises in observational data, tracks smelters representing 80-90% of global production. It sells data to fund managers, traders and miners, It also publishes a free monthly index of global copper smelter activity.

Its global copper dispersion index, a measure of smelter activity, fell to 44.0 in April from 46.8 in March. The April reading was the lowest since March 2021.

The regional dispersion index for North America fell to 24.2 for its weakest since July 2020.



Copper : is the red metal anticipating recession ? Copper Analysis and Chart

The red metal is used in many industries, such as real estate, telecoms, and even increasingly in activities related to the energy transition. In fact, apart from wind turbines, which require a lot of copper, it takes 4 to 8 times more copper to build an electric car than for a combustion car.

This suggests a bright future for copper over the next few decades, as demand is expected to soar. Moreover, the significant deficit between supply and demand, which was already observed before 2020 and which has increased sharply following the drop in investment during the Covid years in particular, should be very positive for the price in the long term.

However, it has fallen by more than 15% since its high point at the beginning of 2023, after having rebounded during the last quarter of last year against the backdrop of the reopening of the Chinese economy. China accounts for more than 50% of global copper demand.

Thus, although the long-term outlook is very positive, the risks of a slowing global economy, or even a recession and a much softer-than-expected economic recovery in China, should keep the copper price under pressure, but offer an interesting buying opportunity for a longer-term horizon.

Copper Daily Price Chart



The price of copper is correcting by more than 15% since the beginning of the year and after having reached an important objective on the lows observed since January 4 and having held on the 2020/2022 oblique support, it is accelerating downwards.

The breach of the oblique confirms the bearish outlook on the price of the red metal and it should reach its next objective, located on the support range, which initiated a rebound at the end of last year and is located at \$3.25/\$3.30. The latter had also served as resistance on numerous occasions in 2017.

Below the latter, we expect a quick return to the \$3 mark. A worsening of the overall economic situation should support this outlook.

Light Vehicle Sales: India slips to 4th position

India has slipped to the fourth rank in light vehicles sales globally in the first quarter of the ongoing calendar year, according to S&P Global Mobility. Light vehicles include all passenger vehicles, small commercial vehicles and vans



less than 6 tonnes. Tim Armstrong, who heads automotive planning solutions at S&P Global Mobility, attributes the trend reversal to the drying

up of pent-up demand in India, rising interest rates and an increase in vehicle prices which has hit the entry-level car buyers hard.

But sales in India are still growing at a healthy pace. "Despite having grown over 20% in the last calendar year, India has still managed to grow in double digits in the first quarter, carrying forward the momentum. We expect it to again touch record sales of 4.7 million units in 2023, beating its own record of 2022 (4.4 million light vehicles)," said Armstrong.

Lithium reserves found in Rajasthan

On February 9, the first Lithium discovery was made in the Reasi district of Jammu and Kashmir where it is reported to have a stash of 5.9 million tonnes valued at \$410 billion. It is said that further studies are required to confirm if the area is feasible for mining.

The Geological Survey of India has found India's second Lithium reserves in Rajasthan.



Lithium is quite a demanding

metal which is used in making mobiles, laptops and all battery-operated devices.

Lithium is said to be the softest and lightest metal in the world making it usable for manufacturing chargeable electronic and battery-powered goods. With an increase of such devices in the market in recent times, there is extreme demand for this metal all over the world which made the metal be called 'white gold'. According to reports the global value of one ton of Lithium is around Rs 57.36 lakhs.

So far with the absence of any reserves of Lithium in India, it was China's monopoly over the supply of the metal.



PV dispatches highest ever in April, grow 13% YoY, shows SIAM data

2-Wheeler dispatches are up 15% YoY, SIAM says all segments have posted growth this April, indicating a smooth shift to BS VI Phase 2 emission norms

Passenger vehicle sales continued to be on a double-digit growth trajectory even as the country transitioned to BS VI phase II emission norms in April. In fact, domestic sales (wholesales) of passenger vehicles this April were the highest recorded in any April, said the Society of Indian Automobile Manufacturers (SIAM).

“Domestic sales of Passenger Vehicles of April 2023 have been the highest ever in April, returning a growth of 12.9 percent, compared to April 2022,” said Rajesh Menon, Director General of SIAM. The total number of units sold in this category was 331,278 units versus 293,303 units a year ago (refer to chart).

Apart from passenger vehicles, two-wheelers, as well as three-wheelers, have also done well in April.

Vinod Aggarwal, President, SIAM, said, “All the segments - Passenger Vehicles, Two-Wheelers and Three-Wheelers have posted growth in April 2023, compared to April 2022, which clearly indicates that the industry has been able to transit very smoothly to BS VI Phase 2 emission norms from April 1, 2023.” He added. “As we gradually get into the monsoon season, among other factors, good rainfall can also help the Auto Industry sustain its growth.”

Despite growth in dispatches, PV segment leader Maruti Suzuki India's production dipped by 5.7 percent in April to 144,097 units. On the other hand, Mahindra and Mahindra (M&M) has managed to raise production by almost 35 percent in April. Tata Motors did not share production numbers.

Two-wheeler sales in April went up by 15.1 percent year-on-year (YoY). Three-wheeler sales more than doubled to 42,885 units in April.

Commenting on sales data of April 2023, Mr Vinod

Aggarwal, President, SIAM said, “All the segments viz. Passenger Vehicles, Two-Wheelers, and Three-Wheelers have posted growth in April 2023, compared to April 2022, which clearly indicates that Industry has been able to transit very smoothly to BS 6 Phase 2 Emission Norms from 1st April 2023. As we gradually get into the monsoon season, among other factors, good rainfall can also help the Auto Industry sustain its growth.”

Commenting on April-2023's performance, Mr Rajesh Menon, Director General, SIAM said, “Sales of Passenger Vehicles of April 2023 has been the highest ever in April, returning a growth of 12.9%, compared to April 2022. Two-Wheelers also posted a growth of 15.1% in April 2023, compared to last year. Domestic sales of Three-Wheelers in April 2023 have reached nearer to the pre-covid levels for the month of April.” According to a recent ICRA report, the electric segment could account for 14-16 percent of new three-wheeler sales (excluding rickshaws) by FY2025, up from 8 percent currently. Penetration is estimated to rise to 35-40 percent by FY2030 as the product gains more acceptance and financing-related challenges subside.

Kinjal Shah, Vice President & Co Group Head, Corporate Ratings, ICRA said in March, “e3Ws (including e-rickshaws) have been at the forefront of India's electrification journey, being among the early adopters. In 10M FY2023, the 3Ws (excluding rickshaws) recorded an electric penetration of 8 percent, compared to 4 percent for two-wheelers and 1 percent for passenger vehicles.” A favorable regulatory environment with central and state government subsidies to lower capital costs, as well as reduction or waiver of registration fees, road taxes, and permit requirements, continues to be supportive of e-auto adoption. “Coupled with the inherently lower running costs, this results in a much lower (40-45%) total cost of ownership (TCO) than conventional diesel or CNG 3Ws, making the conversion to e-autos an attractive proposition,” Shah said.

Domestic Sales for April

Category	April 2022	April 2023
Passenger Vehicles	2,93,303	3,31,278
Three Wheelers	20,997	42,885
Two Wheelers	11,62,582	13,38,588



SLAM						
Summary Report: Production, Domestic Sales & Exports data for the month of April 2023						
						Report I
						(Number of Vehicles)
Category Segment/Subsegment	Production		Domestic Sales		Exports	
	April		April		April	
	2022	2023	2022	2023	2022	2023
Passenger Vehicles (PVs)*						
Passenger Cars	1,51,398	1,42,933	1,12,923	1,25,758	29,451	22,946
Utility Vehicles (UVs)	1,47,606	1,82,268	1,27,282	1,48,005	16,921	17,689
Vans	11,469	10,921	11,511	10,508	126	264
Total Passenger Vehicles (PVs)	3,10,472	3,16,122	2,51,716	2,84,271	46,498	40,899
Three Wheelers						
Passenger Carrier	41,576	54,709	12,555	34,608	35,375	22,997
Goods Carrier	7,566	6,183	7,348	5,367	405	97
E-Rickshaw	469	1,738	830	2,591	-	-
E-Cart	268	131	264	319	-	-
Total Three Wheelers	49,879	62,761	20,997	42,885	35,780	23,094
Two Wheelers						
Scooter/ Scooterette	4,09,280	4,96,196	3,88,442	4,64,389	36,160	49,535
Motorcycle/Step-Throughs	10,85,543	10,45,771	7,35,360	8,39,274	3,69,273	2,08,652
Mopeds	35,960	36,435	38,780	34,925	6	-
Total Two Wheelers	15,30,763	15,78,402	11,62,582	13,38,588	4,05,439	2,58,187
Quadricycle	101	314	26	61	66	296
Grand Total	18,91,215	19,57,599	14,35,321	16,65,805	4,87,783	3,22,476

* BMW, Mercedes, ILR, Tata Motors and Volvo Auto data is not available
 Society of Indian Automobile Manufacturers (SIAM) 2023

SLAM						
Category & Company wise Summary Report for the month of April 2023						
						Report II
						(Number of Vehicles)
Category Segment/Subsegment Manufacturer	Production		Domestic Sales		Exports	
	April		April		April	
	2022	2023	2022	2023	2022	2023
Passenger Vehicles (PVs)						
FCA India Automobiles Pvt Ltd	1,341	1,186	886	558	366	407
Force Motors Ltd	99	4	88	-	-	-
Honda Cars India Ltd	9,122	4,950	7,874	5,313	2,034	2,363
Hyundai Motor India Ltd	59,000	60,491	44,001	49,701	12,200	8,500
Isuzu Motors India Pvt Ltd	223	58	23	34	-	-
Kia Motors India Pvt Ltd	27,650	29,902	19,019	23,216	8,077	7,785
Mahindra & Mahindra Ltd	24,516	33,219	22,526	34,698	643	879
Maruti Suzuki India Ltd	1,52,954	1,44,097	1,21,995	1,37,320	18,216	16,604
MG Motor India Pvt Ltd	3,208	5,418	2,008	4,551	-	-
Nissan Motor India Pvt Ltd	6,000	3,401	2,110	2,617	1,229	633
PCA Motors Pvt. Ltd	35	954	51	1,003	-	686
Renault India Pvt Ltd	8,688	2,868	7,584	4,323	917	75
SkodaAuto India Pvt Ltd	4,387	3,889	5,152	4,009	-	164
Toyota Kirloskar Motor Pvt Ltd	8,735	20,205	14,777	13,896	14	1,307
Volkswagen India Pvt Ltd	4,634	5,480	3,612	3,032	2,802	1,266
Total Passenger Vehicles (PVs)	3,10,472	3,16,122	2,51,716	2,84,271	46,498	40,899

SLAM						
Category & Company wise Summary Report for the month of April 2023						
						Report II
						(Number of Vehicles)
Category Segment/Subsegment Manufacturer	Production		Domestic Sales		Exports	
	April		April		April	
	2022	2023	2022	2023	2022	2023
Three Wheelers						
Atul Auto Ltd	1,559	743	1,346	582	245	133
Bajaj Auto Ltd	24,985	41,296	8,915	31,283	20,053	11,653
Continental Engines Pvt Ltd	421	492	485	358	-	-
Force Motors Ltd	140	210	-	-	84	140
Mahindra & Mahindra Ltd	2,543	4,846	3,009	5,552	18	6
Piaggio Vehicles Pvt Ltd	7,003	6,606	5,889	3,305	1,442	1,329
TVS Motor Company Ltd	3,217	9,652	1,346	1,605	13,938	9,832
Total Three Wheelers	49,879	62,761	20,997	42,885	35,780	23,094
Two Wheelers						
Ather Energy Pvt. Ltd	3,957	7,183	3,894	6,749	-	-
Bajaj Auto Ltd	2,65,101	2,57,834	93,233	1,81,600	1,88,478	1,06,167
Chetak Technology Lte	-	373	-	136	-	-
Hero MotoCorp Ltd	4,06,959	4,30,786	3,88,760	5,86,161	20,131	8,923
Honda Motorcycle & Scooter India Pvt Ltd	3,58,371	3,82,923	3,18,734	3,36,290	42,295	36,456
India Kawasaki Motors Pvt Ltd	17	80	231	415	-	-
India Yamaha Motor Pvt Ltd	68,284	88,535	43,966	52,959	27,783	16,646
Mahindra Two Wheelers Ltd	-	-	14	-	-	-
Okinawa Autotech Pvt. Ltd	10,111	-	10,199	58	-	-
Piaggio Vehicles Pvt Ltd	7,106	6,278	5,223	2,990	1,820	1,446
Royal-Enfield (Unit of Fisher Motors)	67,720	71,014	53,852	68,581	8,503	4,255
Suzuki Motorcycle India Pvt Ltd	65,067	86,036	54,327	67,259	17,690	21,472
Triumph Motorcycles India Pvt Ltd	50	34	86	63	-	-
TVS Motor Company Ltd	2,62,081	2,86,436	1,80,533	2,32,353	90,489	61,930
Total Two Wheelers	15,30,763	15,78,402	11,62,582	13,38,588	4,05,439	2,58,187
Quadricycle						
Bajaj Auto Ltd	101	314	26	61	66	296
Total Quadricycle	101	314	26	61	66	296
Grand Total	18,91,215	19,57,599	14,35,321	16,65,805	4,87,783	3,22,476

Society of Indian Automobile Manufacturers (SIAM) 2023



Statistics

SIAM						
Segment & Company wise Production, Domestic Sales & Exports Report for the month of April 2023						
						Report III
						(Number of Vehicles)
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	April		April		April	
Manufacturer	2022	2023	2022	2023	2022	2023
Passenger Vehicles (PVs)						
A: Passenger Cars						
Honda Cars India Ltd	8,522	4,950	7,239	5,313	2,031	2,097
Hyundai Motor India Ltd	30,050	29,248	20,439	22,397	8,051	6,206
Mahindra & Mahindra Ltd	-	-	1	-	-	-
Maruti Suzuki India Ltd	1,01,389	1,01,319	76,900	90,062	15,205	13,125
Nissan Motor India Pvt Ltd	3,298	63	-	-	1,220	592
Renault India Pvt Ltd	2,197	1,009	2,066	1,082	250	45
SkodaAuto India Pvt Ltd	2,666	1,781	2,652	1,707	-	-
Toyota Kirloskar Motor Pvt Ltd	120	72	2,775	3,716	-	-
Volkswagen India Pvt Ltd	3,156	4,491	851	1,481	2,684	681
Total A: Passenger Cars	1,51,398	1,42,933	1,12,923	1,25,758	29,451	22,946
B: Utility Vehicles (UVs)						
FCA India Automobiles Pvt Ltd	1,341	1,186	886	558	366	407
Force Motors Ltd	99	4	88	-	-	-
Honda Cars India Ltd	600	-	635	-	3	268
Hyundai Motor India Ltd	28,950	31,243	23,562	27,304	4,139	2,294
Isuzu Motors India Pvt Ltd	223	56	23	34	-	-
Kia Motors India Pvt Ltd	27,650	29,902	19,019	23,216	8,077	7,785
Mahindra & Mahindra Ltd	24,214	33,199	22,168	34,694	643	859
Maruti Suzuki India Ltd	40,399	31,877	33,941	36,754	2,885	3,445
MG Motor India Pvt Ltd	3,208	5,418	2,008	4,551	-	-
Nissan Motor India Pvt Ltd	2,702	3,338	2,110	2,617	9	41
PCA Motors Pvt. Ltd	35	954	51	1,003	-	686
Renault India Pvt Ltd	6,371	1,859	5,528	3,241	657	30
SkodaAuto India Pvt Ltd	1,721	2,108	2,500	2,302	-	164
Toyota Kirloskar Motor Pvt Ltd	8,615	20,133	12,002	10,180	14	1,307
Volkswagen India Pvt Ltd	1,478	989	2,761	1,551	118	385
Total B: Utility Vehicles (UVs)	1,47,606	1,62,268	1,27,282	1,48,005	16,921	17,669
C: Vans						
Mahindra & Mahindra Ltd	302	20	357	4	-	20
Maruti Suzuki India Ltd	11,166	10,901	11,154	10,504	126	264
Total C: Vans	11,468	10,921	11,511	10,508	126	284
Total Passenger Vehicles (PVs)	3,10,472	3,16,122	2,51,716	2,84,271	46,498	40,899

SIAM						
Segment & Company wise Production, Domestic Sales & Exports Report for the month of April 2023						
						Report III
						(Number of Vehicles)
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	April		April		April	
Manufacturer	2022	2023	2022	2023	2022	2023
Three Wheelers						
A: Passenger Carrier						
Atul Auto Ltd	808	340	591	201	245	129
Bajaj Auto Ltd	22,296	37,886	6,414	28,320	19,957	11,565
Continental Engines Pvt Ltd	139	73	160	34	-	-
Force Motors Ltd	140	210	-	-	84	140
Mahindra & Mahindra Ltd	901	2,392	1,025	2,119	4	4
Piaggio Vehicles Pvt Ltd	4,233	4,257	3,065	2,363	1,308	1,326
TVS Motor Company Ltd	13,061	9,551	1,300	1,571	13,777	9,833
Total A: Passenger Carrier	41,576	54,709	12,555	34,608	35,375	22,997
E-Rickshaw						
Atul Auto Ltd	90	272	93	265	-	-
Continental Engines Pvt Ltd	20	406	48	324	-	-
Mahindra & Mahindra Ltd	359	1,060	669	2,002	-	-
Total E-Rickshaw	469	1,738	830	2,591	-	-
B: Goods Carrier						
Atul Auto Ltd	526	-	544	-	-	4
Bajaj Auto Ltd	2,897	3,373	2,504	2,963	98	88
Continental Engines Pvt Ltd	262	13	271	-	-	-
Mahindra & Mahindra Ltd	1,152	1,397	1,157	1,228	14	2
Piaggio Vehicles Pvt Ltd	2,773	1,399	2,824	1,142	134	3
TVS Motor Company Ltd	156	1	48	34	161	-
Total B: Goods Carrier	7,566	6,183	7,348	5,367	405	97
E-Cart						
Atul Auto Ltd	137	131	120	116	-	-
Continental Engines Pvt Ltd	-	-	6	-	-	-
Mahindra & Mahindra Ltd	131	-	138	203	-	-
Total E-Cart	268	131	264	319	-	-
Total Three Wheelers	49,879	62,761	20,997	42,885	35,780	23,094



SIAM						
Segment & Company wise Production, Domestic Sales & Exports Report for the month of April 2023						
						Report III
						(Number of Vehicles)
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	April		April		April	
Manufacturer	2022	2023	2022	2023	2022	2023
Two Wheelers						
A: Scooter/ Scooterettes						
Ather Energy Pvt. Ltd	3,857	7,185	3,894	8,748	-	-
Bajaj Auto Ltd	1,401	4,375	1,246	4,548	-	72
Chetak Technology Ltd	-	373	-	138	-	-
Hero MotoCorp Ltd	28,135	27,520	25,438	25,384	557	1,893
Honda Motorcycle & Scooter India Pvt Ltd	1,99,660	2,56,914	1,80,781	2,46,016	20,956	18,798
India Yamaha Motor Pvt Ltd	11,216	16,863	9,674	16,245	3,206	1,708
Okinawa Autotech Pvt. Ltd	10,111	-	10,182	36	-	-
Piaggio Vehicles Pvt Ltd	7,155	5,278	5,223	2,990	1,820	1,446
Suzuki Motorcycle India Pvt Ltd	52,095	74,948	53,098	66,694	6,508	13,716
TVS Motor Company Ltd	95,830	1,02,740	99,096	95,594	3,113	11,902
Total A: Scooter/ Scooterette	4,09,260	4,96,196	3,88,442	4,64,389	36,160	49,535
B: Motorcycle/Step-Throughs						
Bajaj Auto Ltd	2,84,790	2,53,463	91,987	1,77,144	1,88,478	1,06,085
Hero MotoCorp Ltd	3,77,834	4,03,248	3,73,052	3,60,800	19,574	8,030
Honda Motorcycle & Scooter India Pvt Ltd	1,56,711	1,06,009	1,37,953	92,274	21,339	17,660
India Kawasaki Motors Pvt Ltd	117	80	234	416	-	-
India Yamaha Motor Pvt Ltd	57,068	52,676	34,294	36,694	24,057	14,938
Mahindra Two Wheelers Ltd	-	-	14	-	-	-
Royal-Enfield (Unit of Eicher Motors)	67,720	71,014	53,852	68,881	8,303	4,255
Suzuki Motorcycle India Pvt Ltd	10,972	11,988	1,229	565	11,152	7,758
Triumph Motorcycles India Pvt Ltd	60	34	88	63	-	-
TVS Motor Company Ltd	1,30,271	1,47,261	42,657	1,02,437	96,370	49,929
Total B: Motorcycle/Step-Throughs	10,85,543	10,45,771	7,35,360	8,39,274	3,69,273	2,08,652
C: Mopeds						
TVS Motor Company Ltd	35,960	36,435	38,780	34,925	6	-
Total C: Mopeds	35,960	36,435	38,780	34,925	6	-
Total Two Wheelers	15,30,763	15,78,402	11,62,582	13,38,588	4,05,439	2,58,187
Quadricycle						
Bajaj Auto Ltd	101	314	26	61	66	296
Total Quadricycle	101	314	26	61	66	296
Grand Total	18,91,215	19,57,599	14,35,321	16,65,805	4,87,783	3,22,476

Society of Indian Automobile Manufacturers (12/05/2023)

SIAM						
Sub-segment & Company wise Production, Domestic Sales & Exports Report for the month of April 2023						
						Report IV
						(Number of Vehicles)
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	April		April		April	
Manufacturer	2022	2023	2022	2023	2022	2023
Passenger Vehicles (PVs)						
A : Passenger Cars - Upto 5 Seats						
Mini :Seats upto-5, Length Normally <3600 mm, Body Style-Hatchback, Engine Displacement Normally upto 1.0 Litre						
Regular						
Maruti Suzuki India Ltd (Alto,Spesso)	22,665	16,918	17,137	14,110	3,708	2,930
Renault India Pvt Ltd (Kwid)	2,197	1,009	2,066	1,082	260	45
Total Mini	24,862	17,927	19,203	15,192	3,968	2,975
Compact :Seats upto-5, Length Normally between 3600 - 4000 mm, Body Style-Sedan/Estate/Hatch/Notchback, Engine Displacement Normally upto 1.4 Litre						
Regular						
Honda Cars India Ltd (Amaze,Jazz)	4,743	2,519	4,939	3,393	90	4
Hyundai Motor India Ltd (Aura,Grand 10, 20,Santro,Xcent)	27,680	20,936	19,658	18,396	6,548	2,293
Maruti Suzuki India Ltd (iQOO Modela,Baleno,Celerio,Dzire,Ignis Swift,N)	16,978	83,256	59,184	14,935	9,912	10,857
Toyota Kirloskar Motor Pvt Ltd (Ganza)	-	-	2,646	3,653	-	-
Volkswagen India Pvt Ltd (Polo)	785	-	725	-	877	-
Total Compact	1,10,196	1,06,711	87,155	1,00,377	17,227	12,594
Super Compact :Seats upto-5, Length Normally between 4000 - 4250 mm, Body Style-Sedan/Estate/Hatch/Notchback, Engine Displacement Normally upto 1.6 Litre						
Regular						
Mahindra & Mahindra Ltd (Verito)	-	-	1	-	-	-
Total Super Compact	-	-	1	-	-	-
Mid-Size :Seats upto-5, Length Normally between 4250 - 4500 mm, Body Style-Sedan/Estate/Hatch/Notchback, Engine Displacement Normally upto 1.6 Litre						
Regular						
Honda Cars India Ltd (City)	3,779	2,431	2,300	1,920	1,941	2,093
Hyundai Motor India Ltd (Verna)	2,370	8,312	781	4,001	1,513	3,973
Maruti Suzuki India Ltd (Ciaz)	1,768	1,145	579	1,017	1,585	138
Nissan Motor India Pvt Ltd (Sunny)	3,289	63	-	-	1,220	592
Volkswagen India Pvt Ltd (Vento,Virtus)	2,361	4,487	123	1,481	2,007	981
Total Mid-Size	13,564	16,442	3,783	8,419	8,266	7,677
Executive :Seats upto-5, Length Normally between 4500 - 4700 mm, Body Style-Sedan/Estate/Notchback, Engine Displacement Normally upto 2 Litre						
Regular						
SkodaAuto India Pvt Ltd (Octavia Slavia)	2,598	1,781	2,578	1,588	-	-
Total Executive	2,598	1,781	2,578	1,588	-	-
Premium :Seats upto-5, Length Normally between 4700 - 5000 mm, Body Style-Sedan/Estates, Engine Displacement Normally upto 3 Litre						
Regular						
SkodaAuto India Pvt Ltd (Superb)	70	-	74	121	-	-
Specialty						
Toyota Kirloskar Motor Pvt Ltd (Camry)	120	72	129	83	-	-
Total Premium	190	72	203	184	-	-
Total Passenger Cars	1,51,398	1,42,933	1,12,923	1,25,758	29,451	22,946

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



Statistics

SFAI						
Sub-segment & Company wise Production, Domestic Sales & Exports Report for the month of April 2023						
						Report IV
						(Number of Vehicles)
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	April		April		April	
Manufacturer	2022	2023	2022	2023	2022	2023
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)	600	-	636	-	3	266
Hyundai Motor India Ltd (Venue)	9,710	11,698	8,392	10,342	942	1,005
Kia Motors India Pvt Ltd (Sorento)	7,650	13,594	5,404	9,744	2,135	4,205
Mahindra & Mahindra Ltd (Bolero, Xuv100, Thar, Xuv300)	15,346	17,882	14,747	16,118	490	589
Maruti Suzuki India Ltd (OEM Model # Brezza, Fronx, Jimny)	23,426	20,517	11,764	20,620	2,610	146
Nissan Motor India Pvt Ltd (Magnite)	2,504	3,338	1,966	2,817	9	41
PCA Motors Pvt. Ltd (C3, EC3)	-	928	-	993	-	689
Renault India Pvt Ltd (Kiger, Triber)	6,371	1,859	5,576	3,741	667	39
Toyota Kirloskar Motor Pvt Ltd (Urban Cruiser)	-	-	3,524	-	-	-
Total UVC	62,607	69,814	51,960	66,975	6,826	6,989
UV1 : Length 4000 to 4400 mm & Price <20 Lakhs						
Force Motors Ltd (Gukna)	96	4	88	-	-	-
Hyundai Motor India Ltd (Creta)	16,156	15,763	12,651	14,186	2,793	513
Kia Motors India Pvt Ltd (Seltos)	13,009	9,659	7,506	7,213	5,376	2,854
Mahindra & Mahindra Ltd (XUV400)	-	1,136	-	602	-	-
Maruti Suzuki India Ltd (Ertiga, Grand Vitara, S-Cross)	15,578	8,506	17,811	13,274	275	3,272
MG Motor India Pvt Ltd (Asor)	918	1,060	249	704	-	-
Nissan Motor India Pvt Ltd (Kicks)	199	-	144	-	-	-
SkodaAuto India Pvt Ltd (Kushaq)	1,643	1,745	2,413	2,162	-	154
Toyota Kirloskar Motor Pvt Ltd (Model Manufactured for the sale to other countries)	-	12,777	-	2,616	-	1,307
Volkswagen India Pvt Ltd (Taigun)	1,407	989	2,631	1,520	118	385
Total UV1	49,042	51,639	43,493	42,577	8,532	8,505
UV2 : Length between 4400 - 4700 mm & Price <20 Lakhs						
Hyundai Motor India Ltd (Alcazar)	3,005	3,062	2,422	2,037	434	775
Kia Motors India Pvt Ltd (Carens)	6,597	6,649	5,754	6,107	596	715
Mahindra & Mahindra Ltd (Marazzo, Scorpio, Xuv500, Xuv700)	8,818	14,181	7,374	14,374	153	271
Maruti Suzuki India Ltd (XL6)	4,385	2,864	4,366	2,880	-	27
MG Motor India Pvt Ltd (Hector)	1,995	3,121	1,446	3,103	-	-
Total UV2	24,810	29,897	21,364	28,481	1,183	1,788
*Only production volume of OEM Model is reported by Maruti Suzuki India Limited.						

SFAI						
Sub-segment & Company wise Production, Domestic Sales & Exports Report for the month of April 2023						
						Report IV
						(Number of Vehicles)
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	April		April		April	
Manufacturer	2022	2023	2022	2023	2022	2023
UV3 : Length >4700 mm & Price <20 Lakhs						
Isuzu Motors India Pvt Ltd (Hi-Lander, V-Cross)	211	54	20	30	-	-
Toyota Kirloskar Motor Pvt Ltd (Innova Crysta, Innova HyCross)	6,538	2,701	6,351	4,837	-	-
Total UV3	6,749	4,755	6,371	4,867	-	-
UV4 : Price between Rs. 20 to 30 Lakh						
FCA India Automobiles Pvt Ltd (Jeep Compass)	1,341	739	886	268	366	314
Hyundai Motor India Ltd (Kona, Tucson)	38	600	97	550	-	-
Kia Motors India Pvt Ltd (Carnival)	403	-	355	-	-	-
Mahindra & Mahindra Ltd (Alturas G4)	52	-	47	-	-	-
MG Motor India Pvt Ltd (ZS EV)	229	917	228	463	-	-
PCA Motors Pvt. Ltd (C5, Aircross)	35	28	51	10	-	-
Total UV4	2,094	2,284	1,664	1,289	366	374
UV5 : Price >Rs. 30 Lakh						
FCA India Automobiles Pvt Ltd (Jeep Meridian)	-	447	-	292	-	39
Hyundai Motor India Ltd (Ioniq5)	-	100	-	83	-	-
Isuzu Motors India Pvt Ltd (MU-X)	12	4	3	4	-	-
Kia Motors India Pvt Ltd (EV6)	-	-	-	152	-	-
MG Motor India Pvt Ltd (Gloster)	66	320	83	281	-	-
SkodaAuto India Pvt Ltd (Kodak)	79	383	97	142	-	-
Toyota Kirloskar Motor Pvt Ltd (Fortuner, Land Cruiser, Velfire)	2,077	2,656	2,127	2,727	14	-
Volkswagen India Pvt Ltd (Touar)	71	-	130	31	-	-
Total UV5	2,304	3,889	2,430	3,816	14	39
Total Utility Vehicles (UVs)	1,47,606	1,62,269	1,27,282	1,46,005	16,921	17,669
Vans						
C : Vans ; Generally 1 or 1.5 box; seats upto 5 to 10						
V1 : Hard tops mainly used for personal transport, Price upto Rs. 10 Lakh						
Mahindra & Mahindra Ltd (Maxximo, Supro)	266	20	339	-	-	20
Maruti Suzuki India Ltd (Eeco)	11,162	10,901	11,154	10,504	126	264
Total V1	11,462	10,921	11,493	10,504	126	284
V2 : Soft tops mainly used as Maxi Cabs, Price upto Rs. 10 Lakh						
Mahindra & Mahindra Ltd (Supro)	6	-	18	4	-	-
Total V2	6	-	18	4	-	-
Total Vans	11,468	10,921	11,511	10,508	126	284
Total Passenger Vehicles (PVs)	3,10,472	3,16,122	2,51,716	2,84,271	46,498	40,899



SIAM						
Sub-segment & Company wise Production, Domestic Sales & Exports Report for the month of April 2023						
						Report IV (Number of Vehicles)
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	April		April		April	
Manufacturer	2022	2023	2022	2023	2022	2023
Three Wheelers						
A: Passenger Carriers						
A: Passenger Carrier						
A1: No. of seats including driver not exceeding 4 & Max.Mass not exceeding 1 tonne						
Atul Auto Ltd (Atul Gemini, Atul Rik, Atul Rik + 3P, Atul Rik 3P 200, Rik)	378	255	193	135	215	73
Bajaj Auto Ltd (Maxima, RE)	22,296	37,868	6,414	28,320	19,957	11,565
Continental Engines Pvt Ltd (Baxy Express Passenger)	139	73	160	34	-	-
Mahindra & Mahindra Ltd (Alfa, Treo)	901	2,392	1,025	2,119	4	4
Piaggio Vehicles Pvt Ltd (Apo Auto, Apo City)	4,233	4,257	3,066	2,363	1,308	1,326
TVS Motor Company Ltd (TVS King 4S)	13,061	9,551	1,300	1,571	13,777	9,833
Total A1	41,008	54,414	12,157	34,542	35,261	22,801
A2: No. of seats including driver exceeding 4 but not exceeding 7 & Max.Mass not exceeding 1.5 tonnes						
Atul Auto Ltd (Atul Gem)	428	85	398	88	30	58
Force Motors Ltd (Minidor)	140	210	-	-	84	140
Total A2	568	295	398	88	114	196
Total A	41,576	54,709	12,555	34,608	35,375	22,997
Total Passenger Carriers	41,576	54,709	12,555	34,608	35,375	22,997
E-Rickshaw						
Atul Auto Ltd (Atul Elite)	90	272	93	265	-	-
Continental Engines Pvt Ltd (Baxy E Rath)	20	406	48	374	-	-
Mahindra & Mahindra Ltd (e-Alfa Mini, Treo Yaari)	358	1,060	689	2,302	-	-
Total E-Rickshaw	468	1,738	830	2,591	-	-
B: Goods Carrier						
B1: Max mass not exceeding 1 tonnes						
Atul Auto Ltd (Atul Gem, Atul Gemini Atul Smart Aqua, Atul Shakti)	526	-	544	-	-	4
Bajaj Auto Ltd (Maxima)	2,697	3,373	2,504	2,983	96	80
Continental Engines Pvt Ltd (Baxy Cargo, Baxy Cargo Super King EV)	262	13	271	-	-	-
Mahindra & Mahindra Ltd (Alfa, Treo Zor Grand)	1,152	1,397	1,157	1,228	14	2
Piaggio Vehicles Pvt Ltd (Apo Xtra)	2,772	1,399	2,824	1,142	134	3
TVS Motor Company Ltd (TVS King Cargo)	158	1	46	34	181	-
Total B1	7,586	6,183	7,348	5,367	405	97
Total Goods Carrier	7,586	6,183	7,348	5,367	405	97
E-Cart						
Atul Auto Ltd (Atul Elite Cargo)	137	131	120	116	-	-
Continental Engines Pvt Ltd (Baxy E Cart)	-	-	6	-	-	-
Mahindra & Mahindra Ltd (e-Alfa Cargo)	131	-	136	203	-	-
Total E-Cart	268	131	264	319	-	-
Total Three Wheelers	49,879	62,761	20,997	42,885	35,780	23,094

SIAM						
Sub-segment & Company wise Production, Domestic Sales & Exports Report for the month of April 2023						
						Report IV (Number of Vehicles)
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	April		April		April	
Manufacturer	2022	2023	2022	2023	2022	2023
Motorcycle/Step-Throughs						
B : Motorcycles/Step-Through: Big wheel size – more than 12".						
B2: Engine Capacity >75 CC but less than equal to 110 CC						
Bajaj Auto Ltd (Boxer, CT, Discover, Platina)	1,36,252	73,127	44,814	50,987	89,992	44,224
Hero MotoCorp Ltd (HF Deluxe Passion Sponsor)	3,05,859	3,49,177	3,12,927	3,12,854	9,496	5,378
Honda Motorcycle & Scooter India Pvt Ltd (Dream, Livo, Shine)	17,134	3,786	14,504	-	8,020	4,592
India Yamaha Motor Pvt Ltd (Crux, Saluto RX)	2,708	5,985	-	-	3,324	3,360
TVS Motor Company Ltd (Radeon, Sport Star City)	62,455	44,620	31,520	32,474	35,063	14,770
Total B2	5,24,438	4,76,695	4,03,780	3,96,325	1,43,895	72,324
B3: Engine Capacity >110 CC but less than equal to 125 CC						
Bajaj Auto Ltd (Boxer, CT, Discover, Husqvarna, KIM, Platina, Pulsar)	74,950	1,02,281	42,777	81,270	37,937	18,828
Hero MotoCorp Ltd (Glamour, Splendor)	59,375	49,565	52,924	46,723	3,222	648
Honda Motorcycle & Scooter India Pvt Ltd (CB Shine)	1,13,387	91,862	1,05,413	89,281	4,785	2,741
India Yamaha Motor Pvt Ltd (Saluto YD125)	3,070	4,405	-	-	2,650	3,300
Suzuki Motorcycle India Pvt Ltd (Hayate)	240	180	-	-	458	260
TVS Motor Company Ltd (Raider, Star City 125, Victor)	48,117	60,628	3,302	31,431	47,860	28,374
Total B3	2,99,129	3,08,901	2,04,506	2,48,745	96,890	54,155
B4: Engine Capacity >125 CC but less than equal to 150 CC						
Bajaj Auto Ltd (Boxer, CT 150, Pulsar)	36,887	25,311	2,177	18,881	28,209	11,478
Hero MotoCorp Ltd (Hunk)	3,793	1,452	-	-	4,495	1,501
Honda Motorcycle & Scooter India Pvt Ltd (CB Unicorn 150)	200	94	-	-	240	56
India Yamaha Motor Pvt Ltd (FZ, S7)	29,248	24,427	16,508	20,931	15,616	5,266
Total B4	70,198	51,269	18,685	37,812	46,457	18,291
B5: Engine Capacity >150 CC but less than equal to 200 CC						
Bajaj Auto Ltd (Avenger, Husqvarna, KTM, Pulsar)	24,622	37,692	1,340	23,657	19,418	17,764
Hero MotoCorp Ltd (Xpulse 200 Xtreme)	8,807	3,052	7,160	7,202	2,381	508
Honda Motorcycle & Scooter India Pvt Ltd (CB 200X, CB Hornet 160R, C)	21,321	3,714	14,778	-	8,089	5,064
India Kawasaki Motors Pvt Ltd (W175)	-	-	-	143	-	-
India Yamaha Motor Pvt Ltd (MT 15, R15)	19,496	16,118	17,116	15,783	1,449	1,974
Suzuki Motorcycle India Pvt Ltd (Gixxer, Intruder)	7,776	8,565	1,008	508	8,470	5,942
TVS Motor Company Ltd (Apache)	17,072	39,480	7,342	38,148	11,771	5,252
Total B5	99,094	1,09,231	48,804	79,421	51,562	36,539



Statistics

SIAM							
Sub-segment & Company wise Production, Domestic Sales & Exports Report for the month of April 2023							
							Report IV
							(Number of Vehicles)
Category	Production		Domestic Sales		Exports		
Segment/Subsegment	April		April		April		
Manufacturer	2022	2023	2022	2023	2022	2023	
B6: Engine Capacity >200 CC but less than equal to 250 CC							
Bajaj Auto Ltd (Avenger, Dominar, Husqvarna, KTM, Pulsar)	4,145	6,633	288	2,094	4,246	4,829	
India Kawasaki Motors Pvt Ltd (KX 250)	-	-	3	-	-	-	
India Yamaha Motor Pvt Ltd (FZ25)	2,546	1,126	610	-	1,118	1,042	
Suzuki Motorcycle India Pvt Ltd (Gixxer 250, V-Strom SX)	2,956	3,212	238	-	2,226	1,554	
Total B6	9,647	10,971	1,139	2,694	7,590	7,425	
B7: Engine Capacity >250 CC but less than equal to 350 CC							
Honda Motorcycle & Scooter India Pvt Ltd (CB300R, H'ness, MC 300N)	4,629	6,553	3,234	3,013	2,221	5,207	
India Kawasaki Motors Pvt Ltd (Ninja300)	89	-	85	125	-	-	
Mahindra Two Wheelers Ltd (Mojo)	-	-	14	-	-	-	
Royal-Enfield (Unit of Eicher Motors) (Bul at 350, Bul at Electro Classic 350)	56,967	63,430	48,623	62,366	2,042	2,372	
TVS Motor Company Ltd (BMW, RR 310)	2,637	2,553	403	324	1,676	1,492	
Total B7	64,322	72,536	52,329	65,818	6,829	9,071	
B8: Engine Capacity >350 CC but less than equal to 500 CC							
Bajaj Auto Ltd (Dominar, Husqvarna, KTM)	7,834	8,439	581	1,855	10,679	8,964	
Honda Motorcycle & Scooter India Pvt Ltd (CB 500)	-	-	1	-	-	-	
India Kawasaki Motors Pvt Ltd (Ninja 400)	-	-	-	5	-	-	
Royal-Enfield (Unit of Eicher Motors) (Himalayan)	8,959	4,194	3,070	3,621	2,607	767	
Total B8	16,793	12,633	3,652	5,181	13,286	9,731	
B9: Engine Capacity >500 CC but less than equal to 800 CC							
Honda Motorcycle & Scooter India Pvt Ltd (CBR 850F)	20	-	33	-	-	-	
India Kawasaki Motors Pvt Ltd (Ninja 650, Versys 650, Vulcan S, Z650, Z900)	18	80	84	64	-	-	
Royal-Enfield (Unit of Eicher Motors) (650 Twin, Super Meteor)	1,794	3,390	2,159	3,034	2,754	1,116	
Suzuki Motorcycle India Pvt Ltd (DL650CA)	-	-	10	-	-	-	
Triumph Motorcycles India Pvt Ltd (Street Triple, Tiger 660, Tiger 800 XC)	63	-	53	-	-	-	
Total B9	1,885	3,470	2,339	3,068	2,754	1,116	

SIAM							
Sub-segment & Company wise Production, Domestic Sales & Exports Report for the month of April 2023							
							Report IV
							(Number of Vehicles)
Category	Production		Domestic Sales		Exports		
Segment/Subsegment	April		April		April		
Manufacturer	2022	2023	2022	2023	2022	2023	
B10: Engine Capacity >800 CC but less than equal to 1000 CC							
Hero MotoCorp Ltd (883 Iron)	-	-	5	-	-	-	
India Kawasaki Motors Pvt Ltd (Ninja ZX-10R, Z900)	10	-	42	57	-	-	
Triumph Motorcycles India Pvt Ltd (Boneville T100, Speed Twin, Street Triple)	7	34	19	42	-	-	
Total B10	17	34	66	99	-	-	
B11: Engine Capacity >1000 CC but less than equal to 1600 CC							
Hero MotoCorp Ltd (Pan America, Sportster S)	-	-	2	6	-	-	
Honda Motorcycle & Scooter India Pvt Ltd (Africa Twin)	20	-	20	-	-	-	
India Kawasaki Motors Pvt Ltd (Ninja 1000, Versys 1000)	-	-	20	22	-	-	
Suzuki Motorcycle India Pvt Ltd (Hayabusa)	-	31	3	57	-	-	
Triumph Motorcycles India Pvt Ltd (Boneville Bobber, Boneville 1120, Speed Triple)	-	-	12	18	-	-	
Total B11	20	31	57	101	-	-	
B12: Engine Capacity >1600 CC							
Hero MotoCorp Ltd (Fat Bob, Fat Boy 114, Heritage Classic, Road Glide)	-	-	19	5	-	-	
Triumph Motorcycles India Pvt Ltd (Rocket III)	-	-	4	5	-	-	
Total B12	-	-	23	10	-	-	
Total Motorcycle/Step-Throughs	10,85,543	10,45,771	7,36,360	8,39,274	3,69,273	2,08,652	
C: Moped: More than 75 CC to 100 CC and with fixed transmission Ratio, Big wheel size – more than 12"							
C1: Engine capacity less than or equal 100 CC							
TVS Motor Company Ltd (TVS XL)	35,660	36,435	36,780	34,925	6	-	
Total Mopeds	35,660	36,435	36,780	34,925	6	-	
Total Two Wheelers	15,30,763	15,78,402	11,62,582	13,38,568	4,05,439	2,58,187	
Quadricycle							
Bajaj Auto Ltd (Quie)	101	314	26	81	58	298	
Total Quadricycle	101	314	26	81	58	298	
Grand Total	18,91,215	19,57,599	14,35,321	16,65,805	4,87,783	3,22,476	

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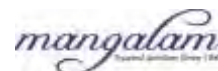
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