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Udayan Pathak
(Chairman, ASM International Pune Chapter)

- **Emerging Trends in Indian Automobile Industry**
- **Silicon Steel Production Technology**
- **Nanotechnology: A boon to metal industry**

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D. A. Chandekar
Editor

Dear Readers,

We all know that today India is the fastest growing large economy in the world, surpassing the major countries like Germany, China, US, etc. We also know that the last two decades belonged to China when it manifested phenomenal economic growth of more than 10 % annually year after year. Infrastructure development was a major contributing factor and the trigger for this fantastic growth curve. Development of roads, bridges, dams, airports, railways, metros etc. not only facilitate the transport and logistics but generate huge employment, consume steel, cement and also other metals. All this make the economy wheel rotate faster. Thus infrastructure development is the key for the economic growth of any region / country.

The reason to narrate the Chinese success story is that Indian government too is giving a lot of emphasis on infrastructure development. China adopted open economy model by late seventies / early eighties, a decade prior to India. They started first with infrastructure development process, invited international auto companies after that and finally the consumer durables. We started with consumer durables, invited foreign auto companies after that and finally understood the importance of infrastructure development. In my opinion, the sequence should have been exactly the opposite. For India also, it has been more than three decades of adopting Liberalizarion and Globalization as economic principles but the real benifits have started coming only after we placed infra development agenda in the centre of our growth strategy. I am seeing India entering the fastest growing part of the famous 'S' curve of the economy.

Friends, 'steel' being the most important input for the infrastructure development, I see a very bright future for our industry on a long term basis. Now this is a very general statement indicating a positive direction in which the industry is likely to move. For an individual company, it is just a possibility not a certainty. There will be tremendous competition all along. One has to take care of quality, price and delivery in a best possible manner, adopt latest technology and processes, employ modern promotion, marketing and branding strategies and then hope for the best. Recycling whatever one can, harming the environment in a minimum possible manner and inducting sustainability are the newest challenges before our industry. We have to address them at individual as well as at the industry level. The government too is pushing the concepts such as Recycling and Green Steelmaking. Lets work on them together taking all the stakeholders in confidence. Only that will convert the possibility of success into the certainty !
The 'Indian Growth Story' has just begun. If it is to continue, it will need a strong support from steel industry. Are we ready ?

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Emerging Trends in Indian Automobile Industry

Auto industry is such a strategically positioned industry that it appeals to the consumers who purchase automobile or steel industry which supplies steel to automobiles & many other metal parts which are used in automobile are supplied by metallurgical industry & so we have chose this subject Emerging Trends in Automobile Industry.

Udayan Pathak (Chairman, ASM

International Pune Chapter) –***Ms Jambhale what are the requirements in terms of the regulations & policies in the next 10 years & how materials & metallurgy can be a kind of crucial role for the success or failure?***

Ms Medha Jambhale

(Dy. Director ARAI)– In last 100 years, automobile has evolved & become more faster & sophisticated. This era is more exciting as well as promising for all of us . In recent years we have seen changes as electrification , autonomous driving, even the flying cars which are completely different from the traditional cars & there is a shift in using the automobiles. Let us understand some transformation that we will be witnessing in the next decade the first transformation that I clearly see is Intelligent Automobile while we are driving, the cars are becoming more smarter when they are connected to the internet like any normal gadget now vehicles are getting connected to the internet & they are giving predictions to a driver so vehicles are really becoming smarter, they can even monitor our eyes. Second transformation that we are looking at is autonomous cars, we will definitely be self driving automobiles. There are some challenges in terms of legislation , infrastructure, societal readiness & acceptance towards this to some extent. A survey says that we can definitely reduce accidents to more than 90% if we go and adopt different features as autonomous car or autonomous vehicle. Next thing that we can see is a integrated vehicle, so these vehicles are getting connected to smart cities this a value added advantage that we will be getting in the next decade. One side cities are becoming smarter, we are seeing huge changes in the public transport, the road & the infrastructure can be seen on one screen. The safety & the future is going to be improved so this is the third trend that we are looking at, as integrated vehicle with smart cities . Fourth trend we are looking at is mobility as a service trend, so the utility is definitely going to increase, it is going to bring different economy trends in the market . One more trend that is going to be there is the alternate power resources i.e. electrification Last trend is manufacturing trend , it is considered that the manufacturing plants are going to change so presently there are huge manufacturing plants & mega factories which are being established they are having different automations for safety, quality , industry 4.0.

The mobility case is little different for India, C stands not only for connected but also comfort A stands not only for autonomous but also affordable S stands not only for shared but also for sustainable & E stands for not only electrical but also for environment friendly vehicles . I feel the targets are going to be changing so how to reduce the weight ? Should we optimize design or should we use alternate material ? What is the right material & developing right material in right time is going to be a continuous challenge in future . These challenges need to be really answered very critically & carefully so material is going to play a crucial role, without material we cannot do anything . Light weight materials like highly advanced

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steels, high strain steel, aluminium, magnesium these are the metals which are taking place into these automobiles. Composition is another area which is going to be there in the market so both particle field composites, fiber reinforced composites are being used similarly Carbon-fiber-reinforced polymers (CFRP) also will be a crucial material that will be used even if it is having some higher cost it is definitely going to be used so these new material also will add some manufacturing processes. There are two trends that I am looking at, one is alternate material design by ICME approach that's Integrated Computational Material Engineering so all the materials that we are developing today & will be developing tomorrow also that will be through ICME approach second trend that we are looking at is the material car development . In ARAI, we are working on both these technologies so Integrated Computational Material Engineering where we could simulate the material starting from micro level that is atomic level to macro level. Second is the material car development, here also ARAI has done considerable progress. So what we have to remember in short is that the change is the only thing that is going to be constant

Udayan Pathak – ***Senthil tell us about the challenges , the crucial role of metallurgy whether it is ferrous or material engineering.***

Senthilkumaran Varatharajan (Head, Materials Technology, Mahindra & Mahindra) - When you look at the current scenario, automotive manufacturers has become

more like integrators but the challenge is how to be integrated but at the same time keep the DNA of the particular brand intact . For example Mahindra which is more like an authentic SUV even though the constituents & the vendors are the same how do we put together a product that will still be the DNA of the product or the brand so this is important . But the most important thing

in the current scenario is the time we take to bring a new product so gone are those days when we use to have one model & it used to run for 10-15 years being the backbone of the revenue nowadays the lifecycle of product is shrinking . If we look at the three things that is defining today's automotive industry it is multi-material, multi-model & multi- market . if we look at the new trend of electrification also we have to meet the safety requirements so we have to use aluminium in the structure we have to use structural composites long fiber, short fiber composites, polymer composites in the automotive front-end so multi material is a important thing. Multi-model that means we need to be very fast in adoption that means it also has a linkage to industry 4.0. The last one is Multi-market many of the Indian OEM's particularly because of the difference in the emission & norms between us & other markets we were not able to do a kind of pan gold export but now because of electrification this particular thing is going to take a big change so that means we need to be ready for multi-market when I say Multi-market there are a lot of material regulation. Sustainability is one of the very prominent point even if we want to attract the investors in any space whether it is an electric vehicle or in a conventional thing the investors first look at what is the robust process. A lot of impetus is going into the coating, surface protection, painting processes, corrosion

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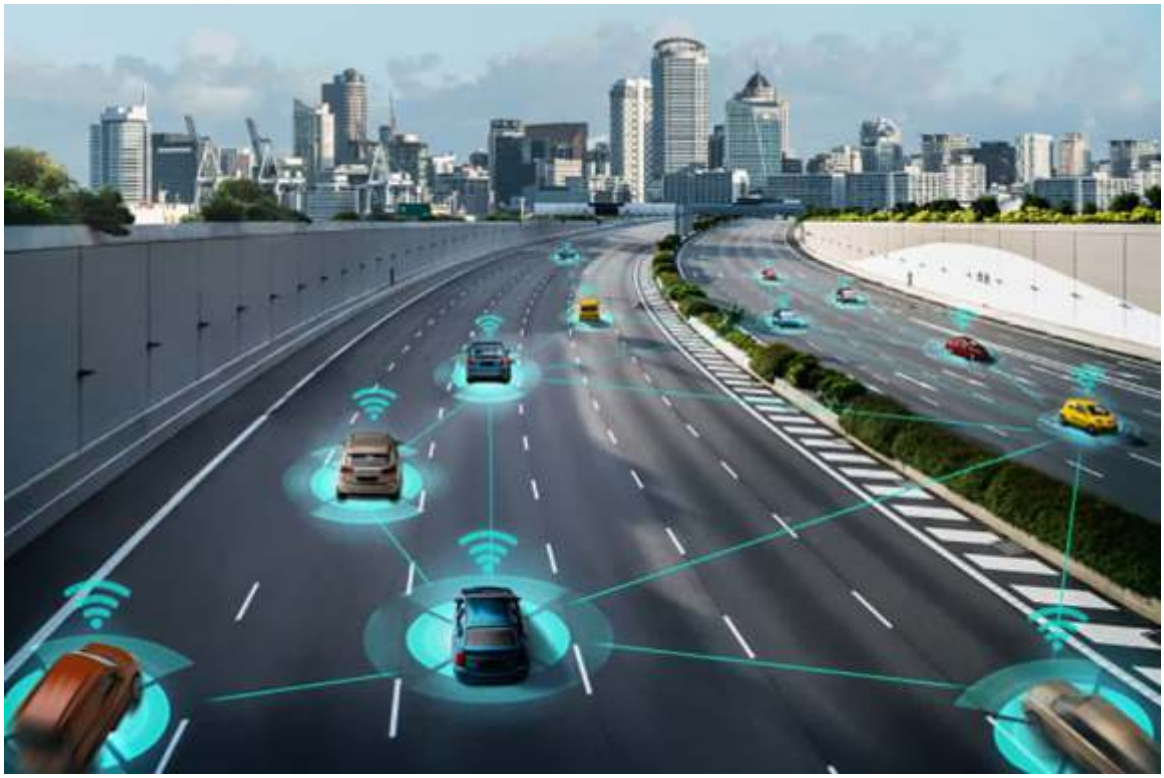
protection. Mahindra is really looking at a group level. We are very conscious about the materials & process selection the kind of equipments we put in our manufacturing facility .The entire industry is moving towards zero emission & zero carbon footprint . Udayan Pathak- Thankyou Senthil one of the point which you really pointed out is that product life cycle is shrinking day by day & the product development time is reducing so from 10 years probably it has come down to 36 months out of which 18 months are going to be the digital arena & 18 months are going to be the physical arena which includes the manufacturing component.

So there the role of suppliers becomes very crucial role so lets go to Rahul Khajure from Volvo, so Volvo itself has set up a benchmark for passenger safety in the Indian markets & with that background Rahul is going to talk about the supplier quality

Rahul Khajure (Lead Supplier, Volvo Group)- If we see on the bird's eye view everything is connected to sustainability . India has signed the Paris agreement to be a carbon neutral by 2070 so that is a target it means a lot of work has to be done in that direction its not an easy task Mahindra, Volvo has a target to be carbon neutral by 2040 we need support from our supply partners. One of the important policy as a country level which Indian government has taken is voluntary vehicle scrap policy, starting from next year onwards so this is one of the key policy now we have challenges how to reduce the emission. Based on recent survey there are more than 1 crore end of life vehicle available in market having age more than 15 years so that means potential vehicles have to be scraped. Imagine 1 crore vehicle has to be scrapped in 5 years what is the market potential? in terms of year on year growth for the automobile sector, so as projection there will be 15 % growth in the automobile industry which is enormous by considering the current situation of recession , supply chain constraint & the war situation globally. There will be increase in demand inspite of difficult situation . There are only 2 important aspects which all our supply partners need to be capable and that is to have a sustainable manufacturing process & second is to be equipped with industry 4.0 , solution like digitalization, automation & so on. First sustainable manufacturing process I think hardly people have imagined that in future we will use green hydrogen instead of coke to make green steel. Steel contributes to around 40 to 45% of vehicle weight, even today for medium to heavy commercial vehicle so sustainable manufacturing process is equally important . Partnership is the new leadership so collaborative work is necessary. Sustainability, industry 4.0 & partnership will definitely be sustainable in business for a long run .



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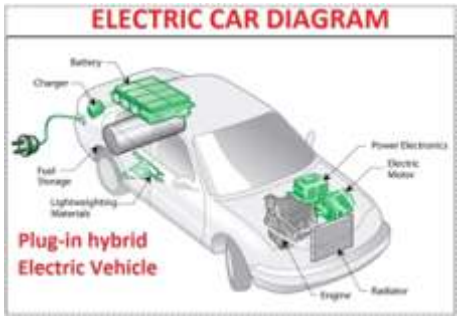
Silicon Steel Production Technology

Akhilesh N Singh
Metallurgist &
Management
Consultant

A new market for Steel producers

Today, with the development of electric vehicles, silicon steel or electrical steel has become an important engineering material for the automobile sector. Electro mobility requires two output components on the drive side: chargeable battery, and electric motor. Electric



motor made of silicon steel, is the heart of vehicle and largely determines automobile efficiency. Depending on the size and type of drive motor (battery-powered or hybrid vehicle), approximately 10 to 100 kg of electrical steel is used in an automobile. Quality of electrical steel will determine efficiency of future vehicles.

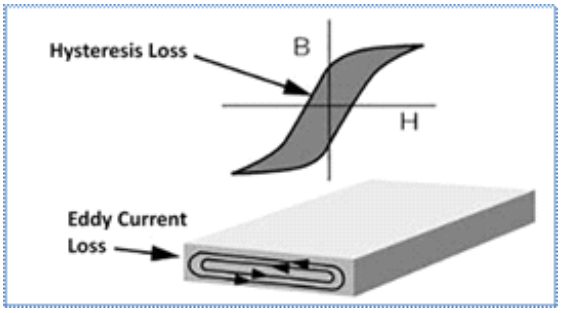
As per the forecast made by various research agencies, by the year 2030, there will be production of 120 million automobiles in the world, and more than 50% will be driven by electric motors. This will generate great demand for silicon steel in quantum of more than 4 million tons per year by 2033, approximately 50% of the current production. The current global annual production of silicon steel is 8.8 million tons. This gives a good business opportunity to steel producers to expand their specialty steel production capacity

In order to meet the increasing domestic and

international demands for Silicon Steel, the Government of India has announced an attractive production-linked incentive scheme. This new opportunity has generated good interest among leading steel producers. The author of this paper was involved in the silicon steel technology transfer from Armco Steel USA, erection & commissioning of Silicon Steel mill, and production of silicon steels at Rourkela Steel plant. The objective of this paper is to provide a comprehensive overview of metallurgy and production technology of silicon steel.

What is Silicon Steel?

Silicon Steel or electrical steel is an Iron-Silicon alloy that utilizes the natural ferromagnetic properties of iron and is used as soft magnetic material in various electrical machines. When steel core is subjected to magnetization by an alternating current, energy losses occur, called iron loss. There are two kinds of iron losses: hysteresis loss-occurs due to migration of the magnetic domains in steel, and eddy current loss-that occurs when an eddy current is induced in steel by an alternating current magnetic flux. Core loss or iron loss reduces efficiency of electric machines and increases the operating costs. Electrical steel, due to its special magnetic characteristics results in minimum iron loss. Silicon is the main alloying element used to improve magnetic properties and reduce iron loss. It was discovered in 1900 by Hadfield that the addition of silicon improves the soft magnetic properties of steel. As Si content increases, magnetic permeability increases due to low magneto-crystalline anisotropy. To reduce eddy current loss, the thickness of the sheet used for making the core is reduced typically in the range of 0.20 mm to 0.65 mm. Electrically insulating coatings are applied to electrical steel sheets to create a nonconductive layer between laminations to reduce eddy current loss.



Types of Silicon Steel

Electrical steel is classified into two main types;

- Cold Rolled Non-Oriented (CRNO), and
- Cold Rolled Grain Oriented

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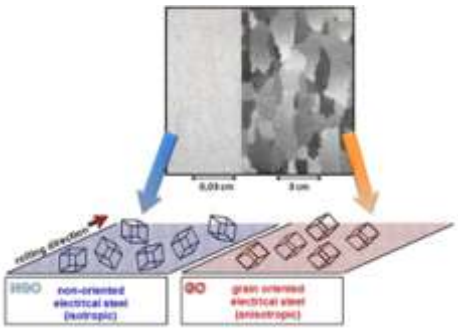


magnetic properties in all directions. They are widely used for iron core materials of rotating machines

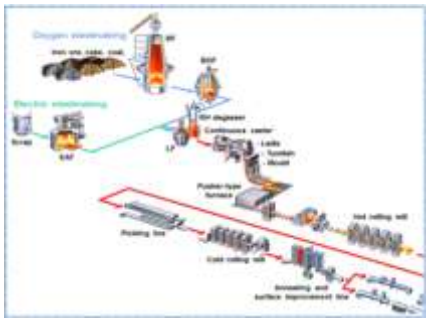
ranging from large-size power generators to large &smallsize electric motors. They are also desirable for the iron core of small-size power transformers.

CRGO electrical steel is mainly used as core material for static equipment (e.g., transformers), in which the magnetization direction is unidirectional. Therefore, the

crystallographic texture is one of the most important characteristics determining the magnetic properties of electrical steel. The texture of CRGO steel is characterized by the orientation of all grains in the 001 direction on 110 planes. This is the easiest magnetization direction parallel to the magnetic field direction.

Production of Silicon Steel

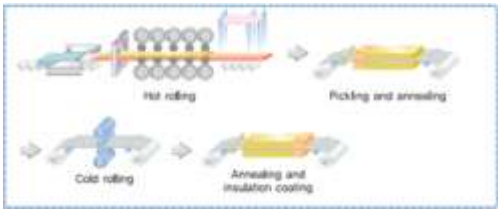
Silicon steel production uses relatively high technology and specialized



processes. Know-how of silicon steel production is proprietary technology, developed and patented by very few leading specialty steel producers in the world. Silicon steel requires a very high degree of chemical purity, silicon is the main alloying element, phosphorus, and aluminium also improve magnetic properties up to some extent. All other elements are highly detrimental to silicon steel. Electrical steel slabs can be produced through BF-BOF-Secondary Refining-Concast, or EAF-Secondary Refining-Concast route. Steel making process can be selected from various options depending on raw material mix, available equipment, and other techno-economic factors. Blast furnace based steel plants as well as EAF based mini steel plants, both can go for the silicon steel production.

Processing of CRNO Steel

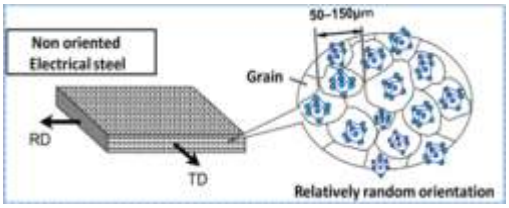
CRNO silicon steel slabs are hot rolled to coils in conventional hot strip mills. After hot rolling following steps are involved In the production of non-oriented electrical steel:



Annealing & Pickling: Hot-rolled coils are pickled/annealed-pickled in a continuous processing line. The complex oxide scale formed during hotrolling is removed by shot-blasting and hydrochloric acid cleaning. Annealing and pickling improve the surface quality and cold rolling properties of steel as well as its magnetic properties.

Cold Rolling: Annealed and pickled coils are cold rolled in reversing or tandem mills to reduce thickness as per specification. To ensure uniform thickness, width, and flatness of the strip, cold rolling mills equipped with automatic controls are used.

Special Annealing: Desired magnetic properties are developed in a special annealing furnace, which



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performs two metallurgical purposes; decarburization and quality annealing. Decarburization is a unique patented technology used to reduce the carbon content of steel in the solid state, using a special furnace atmosphere and controlled temperature. After decarburization, a high-temperature heat treatment is done for the recrystallization of hardened and elongated cold-rolled structures to develop equiaxed isotropic grains with improved magnetic properties. Decarburization and quality annealing can be performed in a single tandem annealing line.

Insulation Coating: To reduce eddy current losses a special insulation coating is applied in a coating line equipped with a coater and drying furnace. Insulation coating separates thin lamination to reduce eddy current loss.

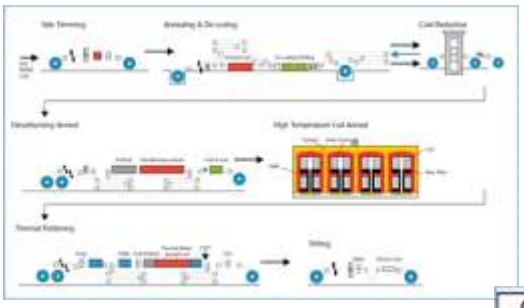
Sheet Shearing and Slitting lines: Finished CRNO silicon steel coils are slitted in desired width or cut to the required length as per the requirements of the customers

Processing of CRGO Steel

CRGO electrical steel usually has a silicon level of 3.5%. It is processed in such a way that the optimal properties are developed in the rolling direction, due to precise control of the crystal orientation. The magnetic flux density increased in the coil rolling direction, although its magnetic saturation decreased to some extent. It is used for making cores of power and distribution transformers.

The production technology of CRGO silicon steel is much more complex and high-tech than CRNO steel right from steelmaking-hot rolling to cold finishing. Another special feature of CRGO steel is a stringent quality specification, it is produced either prime or scrapped. As shown in the process flow diagram, casted slabs are reheated at higher temperatures in a specially designed re-heating furnace and rolled to hot rolled coils in a hot strip mill. Hot rolled coils are processed in the following processing lines of a cold rolling mill complex.

Annealing & Pickling: Hot-rolled coils are annealed

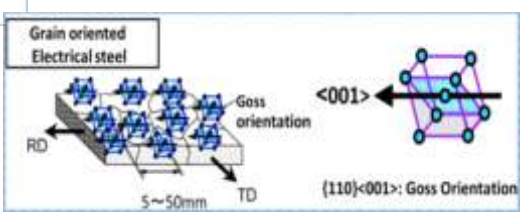


and pickled in a continuous annealing and pickling line. The complex silicon oxide scale formed during hot rolling is removed by shot-blasting and hydrochloric acid pickling. Two-stage annealing and pickling of CRGO coils improve the surface quality, grain orientation, and magneticpropertiesof steel.

Cold Rolling. Annealed and pickled coils are cold rolled in reversing mills or tandem mills to reduce thickness. To ensure uniform thickness, width, and flatness of the strip, cold rolling mills equipped with automatic controls are used.

Decarb Annealing: Carbon is the most detrimental element in silicon steel. Carbon is reduced to a great extent during steel-making and secondary refining processes. Further reduction of carbon is done in a special continuous decarburizing and annealing furnace. Decarburization is a unique patented technology used to reduce the carbon content of steel in the solid state, using a controlled atmosphere and temperature. After decarburization, a special magnesia coating is applied to the strip surface to form an insulating film in the next process of high-temperature annealing.

Box Annealing: Decarburized magnesia-coatedgrain-oriented coils are annealed at very high temperatures in an ultra-pure hydrogen atmosphere in specially designed box annealing furnaces. The main



technology of glass film formation, grain growth, and grain orientation takes place during the box (batch) annealing. This is the core process of grain-oriented technology, which requires very high-quality equipment and a fool-proof control system.

Insulation Coating: Box annealed coils are again processed in a continuous line, in which thermal flattening and

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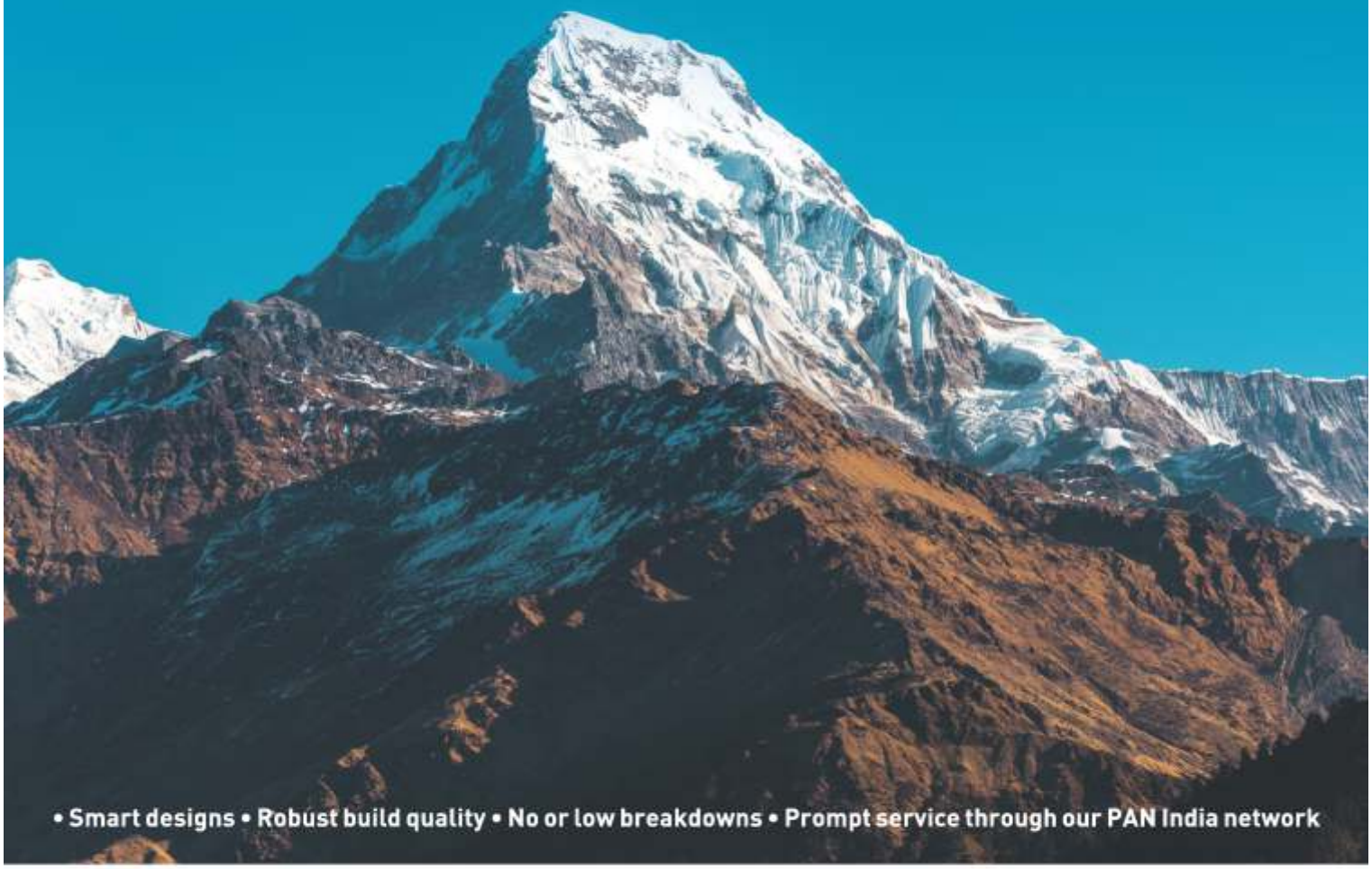

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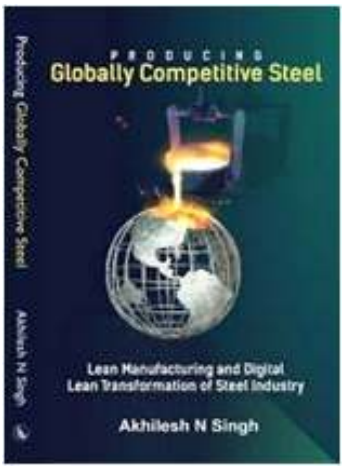
a special insulation coating done on finished CRGO strips.

Sheet Shearing and Slitting: Finished CRGO silicon steel coils are slitted tothe desired width or cut to the required sheet lengths as per the requirements of the customers.

Packaging & Handling: CRGO silicon steel is very sensitive to the careless



handling of finished sheets. Any jerk or mechanical impact increases the stress in sheets resulting in higher iron loss. Therefore special care is taken during the packaging, handling, and delivery of CRGO steel to customers. CRGO is usually supplied by the steel mills in coil form and has to be cut into "laminations", which are used to form a transformer core. Grain-oriented steel is used in large power and distribution transformers and in certain audio output transformers.

World-class Manufacturing of Silicon Steel

Silicon steel is a special type and expensive material can be efficiently manufactured by adapting world-class metallurgical techniques. In order to make it globally competitive and profitable, a Just-In-Timeworld-class system should be used. JIT production technique developed by Toyota, can facilitate Silicon Steel producers to increase throughput, reduce inventory, ensure faster delivery, and higher profitability. Author is a specialist of Silicon Steel, Stainless Steel and JIT production technique, has described JITwith real examples in his latest book on "Producing Globally Competitive Steel". To adapt JIT, the entire process right from steelmaking-hotrolling-cold rolling-to dispatch should be designed and managed as a single value stream. To minimize the production costs and maximize utilization of silicon steel production facilities, the throughput and cycle time of all processes must be levelled according to demand rate, which is an unique approach of JIT production system. It may be an out-of-box thinking for steel producers.

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Nanotechnology: A boon to metal industry

Nanotechnology is the study of materials at the nano scale which is between 1 to 100 nanometers. Nanoparticles constitute a crucial and technology-intensive area of research and development in the burgeoning field of nanotechnology and nanoscience. It is one of the most popular areas of current research and has developed in multiple disciplines, including metallurgy.

Nanomaterials can be added to cement, steel, aluminium, cloth and other materials to make them stronger and yet lighter. Steel is one of the most widely used engineering materials in the world. Iron is its main constituent. Because of its abundance and low cost, it is generally used to produce a wide variety of engineered microstructures with superior properties and recyclability.

There is a growing awareness about the potential benefits of nanotechnology in the modern engineering industry, and a number of leading R&D institutes and companies are pursuing research in the area of nanostructured steels. While conventional metallurgical methods have reached certain limits, nanotech metallurgy has the potential to break the traditional barriers in the metals processing and manufacturing technologies. The strength of steel can be increased by as much as 10 times using this inexpensive process and making them more resistant to corrosion.

Dr. Ramesh Chaughule
Ex Senior Scientist,
Tata Institute of Fundamental Research, Mumbai
Adjunct Professor,
Ramnarain Ruia Autonomous College, Mumbai

This is done by modifying the chemical composition and/or microstructure of bulk material or surface layer. The use of copper nanoparticles reduces the surface roughness of steel which in turn limits the number of stress risers and hence fatigue cracking. By regulating

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the formation of a fine grain structure, taking account of self-organization of nano phases, not only the strength but also the plasticity and cold strength of the steel may be increased on the basis of local
synergetic transitions and thermo mechanical treatment.

Fundamental concepts

In the nanotech metallurgy, researchers have studied nanophase effects on processing materials properties (such as mechanical, physical and chemical), production of nanophases, interaction between nanophases and molten metal, solidification and thermomechanical processing of metals containing nanophases. It is better to know what a nanophase.

Nanophases: Nanotech metallurgy consists of synthesis of materials, production and nanophases such as nanoparticles, carbon nanotubes, graphenes, nanowires etc. Nanophase synthesis is becoming economical due to rapid development. As compared with the conventional metal matrix composites (MMC), these additions of nanophases are superior to MMC which have poor ductility, machinability and low fracture toughness.

These materials have a grain size between 1 to 100 nms. They exhibit 5 times harder mechanical properties compared to normal materials with large grain size. Also they have significant physical and mechanical properties. Generally nanophase metals are harder and more brittle whereas nanophase ceramics are more brittle. This is due to the large percentage of atoms remaining in grain boundary regions. The mechanical properties of nanophase metals are dependent on their
grain-size and totally different from coarse-grained counterparts. Pure metals and intermetallics are stronger but they are less ductile; however, intermetallics show increased ductility when their grain size is decreased.

Nanophase materials are prepared by the consolidation of nanometer sized particles using inert gas condensation or creating small grains using mechanical attrition in which larger particles are milled to create a very small grain size.

Steel

For example carbon steel wire is a nanostructured steel produced on a large scale introducing dense dislocation steel structure and giving rise to the strengthening due to the ferrite lamellar structure that contains very high dislocation density and super saturated carbon atoms. Such wires are used for reinforcing automobile tyres, suspension bridges and power cable wires. To go for still higher strength (~4000 MPa), researchers have used high-Sr and high Sr-Cr steel wires.

Cement and concrete

Basic materials such as cement and concrete are other examples to have higher strength using nanotechnology. By adding nanoparticles, concrete obtains higher strength and durability. Also it has higher fire resistance, compacts more quickly and is very easy to clean since the surface is smooth. These nanoparticles are nanosilica, carbon nanotubes, carbon nanofibers etc as nanostructured materials.

Nano silica is used to increase mechanical strength, as fire resistant, flame proofing and anti-reflection in windows. Carbon nanotubes, when used, have greater mechanical durability, crack prevention, and enhanced mechanical and thermal properties. Carbon nanofibers. The addition of nanofibers improves strength and toughness. This helps to improve concrete's strength and toughness which is suitable for use in high stress construction applications.

Conclusion

The improvement of metals' mechanical properties is one of the main challenges in the metallurgical industry. The review describes the novel approach of nanotechnology application for the production of industrial materials with incorporation of nanophases to gain higher mechanical, physical and chemical properties.

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Dr. N.S. Poonawala is author of two books - Human Engineering and Quality Engineering Through Materials Failure Analysis

Dr Poonawala is Metallurgical Engineering graduate from COE Pune in 1967. Working in various ferrous foundries, he did his research at R & D Labs of Mukand Iron & Steel Co. Ltd. saving the company Rs. 60 lakhs. He got his M.E. (Foundry Research) on this work in 1977. subsequently, he joined academics at VJTI and rose from lecturer, Asst. Professor and finally H.O.D. in 2003-05 in the Dept. of Production & Industrial Engineering. During 1988-1991, a research project at IIT Kharagpur, sponsored by TISCO, Jamshedpur earned him his Ph.D.

Along with academics, Dr. Poonawala is associated with organizations like BPC, CII, NGCE, Bahai Academy, IMC-RBNQA etc. He is a member of Institution of Engineers (India), MIIIE, FISME, SME (USA) etc. and had consulting/training assignments with Mukand, NPIL, Yogeshwar Implants, Humphreys & Glasgow, Raman & Demm (Eicher), Tata SSL, Grindwell Norton, Aarti Drugs, Zenith Chemicals, Rio-Tinto Diamonds, BCCI, CNW etc. A few of the projects at Bharat Gears, Siemens, L & T, Godrej & Boyce, Mukand, M & M, Thermax, Bajaj Auto, Cromption Greaves etc. were quite beneficial to these organizations.

*Book Review : Quality Engineering Through Materials Failure Analysis

It is indeed nice to find oneself in a happy position to review a useful and practical booklet on 'Quality Engineering Through Materials Failure Analysis', written by Prof. Dr. N.S. Poonawala. in these opportune times of 'Make In India'.

Quality Engineering takes the centre stage for manufacturing products and parts, ensuring that they vie for their rightful place in international markets, both for their quality and competitive pricing. Presenting Quality from the micro and macro aspects of materials, together with a wide range of failures and investigation methods in a lucid, practical manner, Dr. Poonawala packs in a high value to this booklet. Metallurgical aspects of Heat Treatment, Surface Engineering, Alloying & Strengthening Mechanisms and Hardness Testing are all given their due, but brief coverage. Also touched are the topics: Maintenance Management, Design for Manufacture & Service, Manufacturing and Processing defects - all topics that form stepping stones to Quality Engineering have been well-covered. I hope that the missing topic of 3-D Printing will find its rightful place in the future editions.

Dr. Poonawala puts his invaluable experience of over 50years, striding both academic and industry, to bridge the information vacuum for both the layman and the practitioner. This booklet, written in simple language, offers a practical bird's eye view of the subject to both these readers.

Wishing him the best for super success of this booklet offered at a right moment to the engineering family.

Human quest has been the singular driver for the growth and explosion of knowledge from time immemorial.

Book Review - Human Engineering

Human quest has been the singular driver for the growth and explosion of knowledge from time immemorial.

However, knowledge puts humans in a predicament, for it can lead humanity in directions both philanthropic and suicidal. The current global scenario reflects the extremes that humans inflict upon themselves, to their own dismay.

The reins of knowledge, however wrest in the hands of humans alone - if only they can exercise the power! True power, can alone lead to peace, harmony and prosperity in the world. It also grounds them to life's realities.

True power dawns with profound knowledge of the 'self'. It entitles humans the power to guide themselves towards worthy actions.

I am happy that Dr. N.S. Poonawala's book, "Human Engineering", appears at such an opportune time, to fill the discernable void in the current times. It can definitely bring in balance and necessary grounding to all working people, and enrich their lives. There is no better starting ground than 'self', to gain knowledge of the universe.

The book devotes to inner and outer planes of life in simple detail. The book is well-organized too, and replete with useful illustrations.

I am sure that "Human Engineering" will be well-accepted by students, teachers and working professionals alike, as it ably attempts to help them sail through highly competitive and tough times that have come to stay.

I wish the book great success.

S.R.Das

Ex-Professor, Mechanical Engineering Department, SSJCET, Asangaon

Ex-Visiting Faculty to Mechanical Engineering Department, VJTI, Matunga

Each book cost is Rs.300/ shall be available in a pack of 2 for Rs.500/ and payment can be done by NEFT at Greater Bank, Vile Parle (East Branch) in the name of

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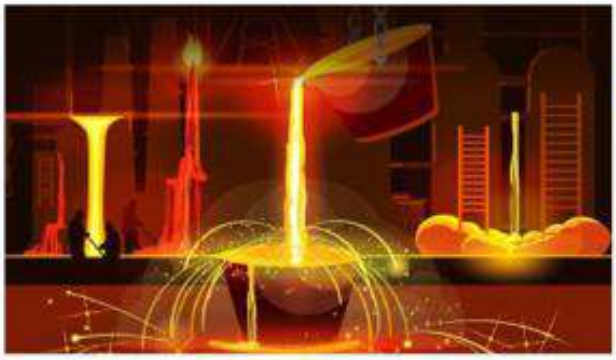

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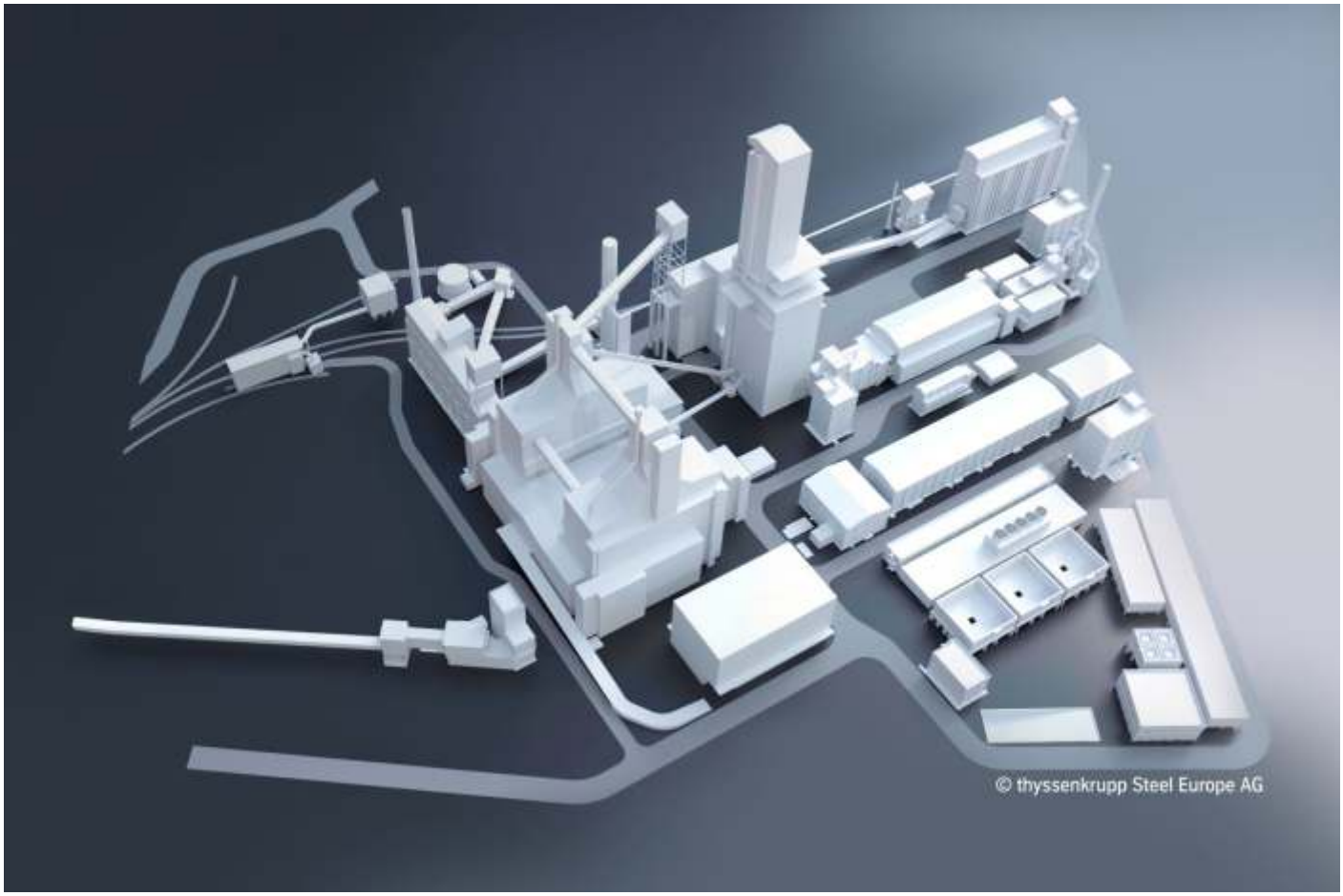

Thyssenkrupp Steel awards a contract worth billions of euros to SMS group for a direct reduction plant

Thyssenkrupp Steel places an order with SMS group, Düsseldorf, for the engineering, delivery and construction of the first hydrogen-powered direct reduction plant at the Duisburg location. This marks the start of one of the biggest industrial decarbonization projects worldwide, which at one stroke will avoid more than 3.5 million metric tons of CO_2 per year in the future. The order volume for SMS amounts to over 1.8 billion euros, and also marks the largest single order in the history of the company. Moreover, significant additional structural building services will be required in addition to infrastructure and media connections. The preliminary tasks can be started immediately, under the scope for an earlier start to work that has been approved. The plant will have a capacity of 2.5 million metric tons of directly reduced iron (DRI), and is scheduled for completion by the end of 2026. The overall project remains subject to European Union approval under state aid provisions, as well as the final funding decision. Both are expected in the coming months. The state of North Rhine-Westphalia and the German government have already signaled substantial financial support for the project.

Replacement of CO_2-intensive primary steel manufacture begins

The contract award marks a decisive technological turnaround for Germany's biggest steelmaker in its more than 200-year history: As part of the tkH2Steel transformation concept, the replacement of CO_2-intensive

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steel production by climate-friendly technologies is now beginning. Up to this point, coal-based hot iron production in the blast furnace always involved emitting large amounts of CO_2, amounting to about 20 million metric tons per year from the Duisburg location alone. Hydrogen-based processes in direct reduction plants offer a significant basis for

manufacturing carbon-neutral steel in the future. thyssenkrupp Steel is already planning to avoid as much as 6 million metric tons of CO_2 by 2030, representing well in excess of 30 percent of its emissions. The transformation to carbon-neutral production should be completed by 2045 at the latest.

Order is awarded to SMS group: a globally active plant builder based in North Rhine-Westphalia

SMS group, a company from North Rhine-Westphalia, has been awarded the contract for the ground-breaking plant at thyssenkrupp Steel. SMS employs a good 14,500 people at around 100 locations. As a specialist for steel industry production plants, it is actively helping shape the transformation of the industry. The order that has now been placed is also historic for SMS: It is the largest single order in the company's history spanning more than 150 years.

High-tech for carbon-neutral steel production

In pursuit of the best technological solution, thyssenkrupp will be the first steelmaker in the world to combine a 100-percent hydrogen-capable direct reduction plant with innovative melters. Positioning the two melters immediately adjacent to the direct reduction plant allows the solid input stock produced there to be converted into molten iron immediately; this makes the entire process particularly efficient. In addition, the spatial requirements and constraints a complex iron and steel plant involves can be taken into account. The direct reduction plant is based on MIDREX Flex technology. SMS will also deliver the innovative melters, slag granulation and other auxiliary equipment, for example water recycling. SMS is building the plant on an EPC basis. This means the company bears overall responsibility for the engineering, procurement and construction of the plant. In addition, significant further work is required relating to structural and civil engineering, infrastructure and media supply.

The innovative concept ensures consistently high product quality. This is because it is seamlessly integrated into the existing iron and steel plant, thereby allowing all subsequent process steps from the steel mill onward to be maintained. As a result, the existing plant structure can be used efficiently. Customers will continue to receive the complete, high-quality product portfolio with the premium quality they are accustomed to.

Major step toward innovative, industrial climate change mitigation

The cooperation between thyssenkrupp Steel and SMS also sends a strong signal for North Rhine-Westphalia as an industrial center. In building the direct reduction plant, the two companies are forming a partnership for innovation and efficient industrial climate change mitigation. At the present time, thyssenkrupp Steel is still responsible for 2.5 percent of Germany's CO_2 emissions, but the first direct reduction plant alone will save over 3.5 million metric tons of CO_2. This corresponds to 20 percent of the company's

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current emissions, more or less, and underlines thyssenkrupp Steel's leading role in the steel industry's transformation. At the same time, the underlying technological concept can serve as a model for many other decarbonization projects in the industry in Europe and beyond.

Moreover, this step into the transformation will preserve many thousands of high-quality and highly qualified jobs. The innovation alliance between thyssenkrupp Steel and SMS will also call for new qualifications, in addition to the jobs created during the construction of Germany's biggest direct reduction plant.

The detailed planning and preparatory work for construction of the direct reduction plant will commence immediately, under the scope for an earlier start to work approved by the German government. One of the tasks on the list involves getting the construction site ready on the plant premises of thyssenkrupp Steel.

In parallel to the project, thyssenkrupp Steel will enter into an open and transparent dialog with neighborhood residents, politicians and the general public, to explain the pioneering project that is now being developed to decarbonize steelmaking at the Duisburg site.

Quotes:

Hendrik Wüst, Minister President of North Rhine-Westphalia: "One of the most important projects for the industrial transformation in North Rhine-Westphalia is going to be implemented: The contract award to the Düsseldorf-based SMS group represents a great decision for the climate, for thyssenkrupp and for the location of North Rhine-Westphalia. It shows: in our federal state, there is not only the knowledge to produce basic materials carbon-neutrally, but also the competence to build the necessary plants. In this way, we are combining climate change mitigation with sustainable industry and its high-quality jobs, and are taking a major step toward becoming a carbon-neutral industrialized country. We are supporting this project with conviction and to the tune of up to 700 million euros, thus contributing to the preservation and transformation of an important value chain for the entire economy in the state."

Martina Merz, CEO thyssenkrupp: "At thyssenkrupp, we are doing everything in our power to accelerate the green transformation. This is also the reason why, despite all the challenges and uncertainties, we are already launching the direct reduction plant. We cannot wait until all the issues have been resolved. We must act now and invest now if we want to achieve our climate targets and secure the future of this industrial location. That is why today is a great day, both for the climate and for the industrial transformation in our federal state."

Bernhard Osburg, CEO of thyssenkrupp Steel: "With this contract award, we are now embarking on the implementation and industrialization of our transformation. It is a historic day for thyssenkrupp Steel and good news for industrial climate change mitigation – since, just by itself, our first direct reduction plant will enable us to avoid emitting 3.5

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million metric tons of CO_2. We are very pleased that we have SMS as our partner for the technological leap into hydrogen-based steel production. Together, we intend to demonstrate that an innovative and sustainable transformation of the steel industry is possible in Germany and Europe. We are thus creating the basis for tomorrow's green steel markets."

Burkhard Dahmen, CEO SMS group: "This project means a great deal to us. thyssenkrupp and SMS have been working together closely for many decades now. We are looking forward to taking responsibility for this forward-looking project as well. We are also delighted that our technology, know-how and expertise in project management will support the green transformation at Germany's biggest steel producer. We all know: this is an important milestone on the road to a green metals industry."

Tekin Nasikkol, Chairman of the General Works Council at thyssenkrupp Steel: "Today marks the start of the green, carbon-neutral future for thyssenkrupp Steel Europe AG. This marks a historic day for all of our more than 26,000 colleagues, and one on which we are sending several powerful messages at once. Firstly: As the beating heart of North Rhine-Westphalia's economy, the steel industry has a CO_2-free future.

Secondly: We are creating long-term job security for the Duisburg location, for our workforce and indirectly for tens of thousands of jobs in processing companies in North Rhine-Westphalia. And thirdly: We are proving that we are not an "old economy" – we are becoming pioneers for the "green economy" in Germany and ensuring that our customers also become more sustainable."

Sören Link, Mayor of Duisburg: "This historic investment is a giant step on the road toward green steel. At the same time, it represents a commitment to Duisburg as a business location, and a commitment to innovation and climate change mitigation. We in Duisburg are continuing to work on becoming the most climate-friendly industrial city in Germany!"

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Carbon capture and storage - Why nickel alloys are capturing att

As industries around the globe work to reduce emissions of carbon dioxide, there is also effort to prevent its escape into the atmosphere by sequestering it. These technologies are known as carbon, capture and storage.

To help achieve the ambition of net zero anthropogenic greenhouse gas emissions, the Nickel Institute continues to explore what kind of contribution and criticality nickel

will play in the successful deployment of carbon capture and storage (CCS).

This is an endeavour that includes the entire CCS value chain from mature carbon capture, transportation to sub-surface storage.

Going for higher grades

Corrosion and correct material selection are key concerns in the development of safe, reliable, and economical operation of CCS infrastructure.

Many CCS processes involve low temperatures with free water present, resulting in acidic conditions and risk of corrosion. As such, carbon steel is not suitable and therefore higher- grade nickel-containing stainless steels and nickel alloys are often required.

Carbon capture from gases often contains water, typically originating from combustion processes. Processes either operate in wet acidic conditions or require prior drying to capture CO2. Some operate at high temperatures and in harsh conditions, which are also unsuitable for carbon steel.

Getting there

CO^2 transportation from carbon capture to sub-surface storage will primarily be through pipelines, shipping, trucking and rail.

Carbon dioxide is liquefied to enable it to be shipped to a sequestration location. Equipment to transport CO^2 from carbon capture to sub-surface storage also requires nickel-containing low alloy steel, stainless steel or nickel alloys.

Going below

CO^2 injected into sub-surface storage is typically dry and non-corrosive. However, a well must be designed to account for the risk of acidic conditions being present, leading to corrosion during its lifetime.

Data from well design in the US and EU show that nickel-containing stainless steel and nickel alloys are typically selected for critical well infrastructure at risk of corrosion. The US has set out clear guidelines for CO^2 injection well design and construction that emphasise selection of materials, supporting the criticality nickel will play in CO^2 sub-surface storage.

To assist in material selection for CCS processes, The Association for Materials Protection and Performance (AMPP) is developing *Guidelines for Materials Selection and Corrosion Control for CO^2 Transport and Injection*, identifying where nickel-containing materials are preferred.

As industries continue to evaluate the value chain of CCS, it is evident there are very few steps that will not need nickel-containing low alloy steel, stainless steel or nickel alloys. This demonstrates nickel's vital role in deploying CCS to help achieve net zero anthropogenic greenhouse gas emissions in the years and decades to come.

CMC ORDERS ITS FOURTH DANIELI MIDA QLP MINIMILL

Pioneer in endless rolling since 2009, the American steelmaker Commercial Metals Company (CMC) has awarded Danieli the order to supply a fourth Hybrid-ready, MIDA QLP plant for the production of 500,000 shtpy of various sizes of both straight length and spooled rebar. The selected location for CMC's new minimill is Berkeley County, West Virginia.

Scrap will be melted by a Digimelter unit charged via endless scrap charging system.

Patented Q-One power feeders will give the most suitable power to both melting and refining units, with negligible impact on the electric network. Hybrid by design, Q-One will allow future use of renewable energies.

A single-strand Octocaster featuring FastCast Cube oscillator and octagonal mould will ensure endless rolling operation.

The mill featuring cantilever and housing less stands will roll endless billets into straight bars, perfectly collected by a Danieli-patented DRB Direct Rolling Bundling station.

A K-Spool line incorporating a four-pass finishing block will provide torsion-free deformed bars in coils up to 5 tons, continuously.

The MIDA QLP minimill will be run by Danieli Automation process control systems and make use of Danieli robotic solutions.

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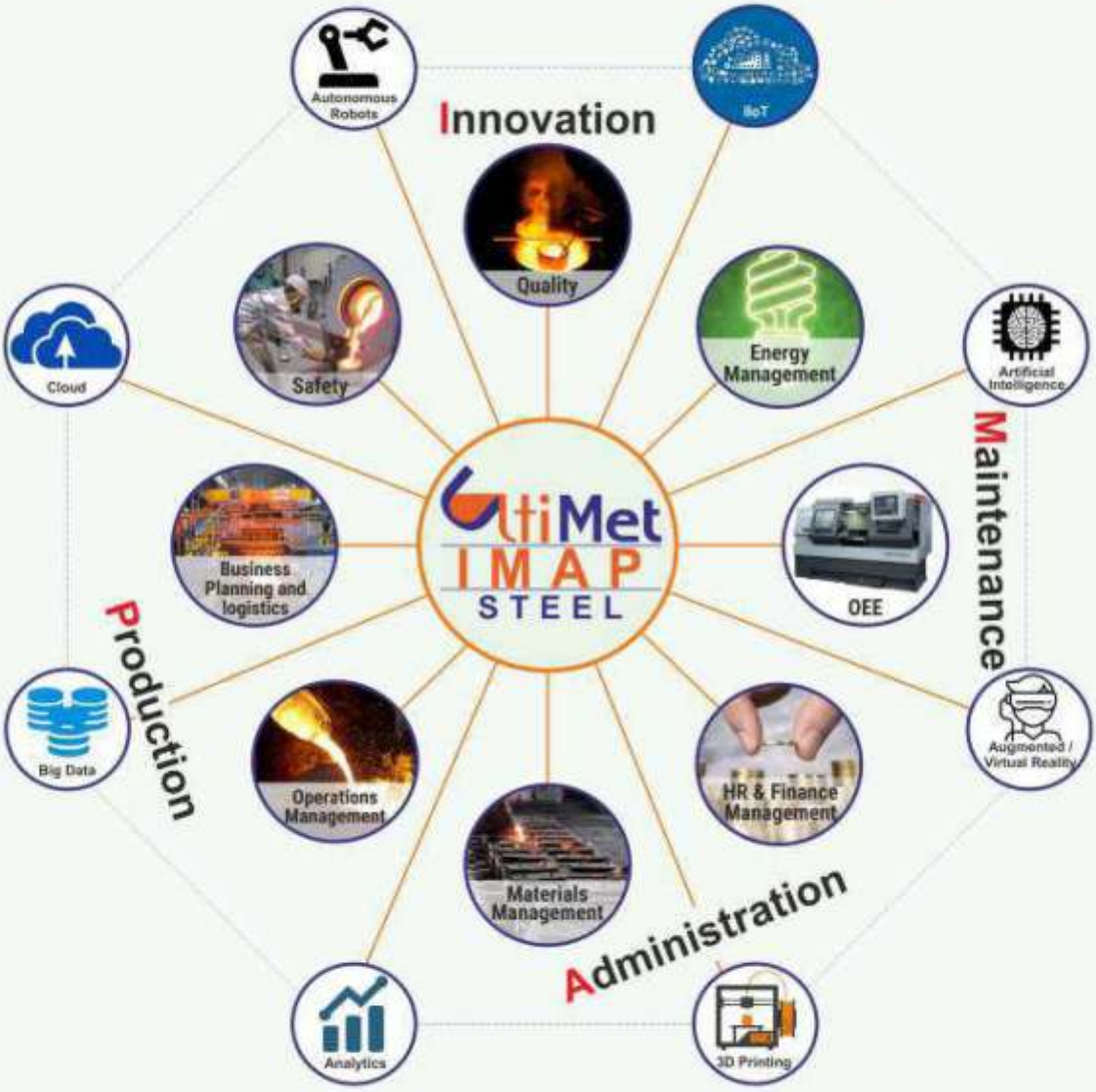

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The new minimill, named CMC Steel West Virginia, is scheduled to begin operations in late 2025.

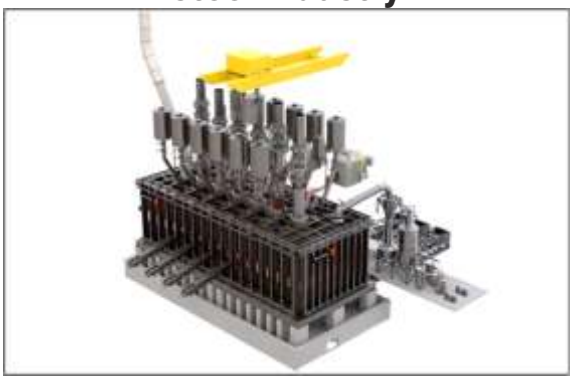
Barbara R. Smith, Chairman of the Board, President and Chief Executive Officer, said,

"We are pleased to enter the next phase of this exciting investment and to establish CMC's manufacturing presence in West Virginia. The state offers several attractive advantages for CMC Steel West Virginia, including a welcoming business climate and a skilled available labour force. The planned site, located in the eastern panhandle of the state near Martinsburg, is well-situated to serve key metropolitan markets in the Mid-Atlantic and Northeast, as well as the Midwest."

Ms Smith continued, "CMC Steel West Virginia is a core component of CMC's strategic growth plan and will help ensure our long-term competitiveness in critical geographical markets. We believe this new micro mill, among the most environmentally friendly steelmaking operations in the world, will strengthen our operational network throughout the Eastern U.S. by achieving synergies with our existing mill and downstream facilities."

This is the 25th order received by Danieli for this unique, patented, endless casting rolling technology in operation worldwide.

Metso Outotec launches DRI smelting furnace to decarbonize iron and steel industry



Metso Outotec is launching the innovative DRI (direct reduced iron) smelting furnace to substitute blast furnaces for iron and steel making. The DRI furnace is one of Metso Outotec's key solutions for decarbonization of the iron and steel industry, which currently produces about 8% of the global carbon dioxide emissions.

"The DRI smelting furnace is a true breakthrough technology. It will help the iron and steel industry to reach their CO_2 emission reduction targets and limit global warming. The new high-capacity six-in-line DRI smelting furnace is part of Metso Outotec's Planet Positive offering, which is focused on environmentally efficient technologies," says Jyrki Makkonen, VP smelting at Metso Outotec.

DRI smelting furnace technology is based on proven Metso Outotec equipment. The furnace and related products are complete and ready for implementation. Customer-specific pilot-scale testing will be conducted in the Metso Outotec research facilities to demonstrate large-scale DRI smelting.

The DRI furnace uses easily available furnace-grade iron ore instead of DRI-grade iron ore by managing larger volumes of slag than can be handled by electric arc furnaces. It can be integrated with Metso Outotec's hydrogen-based Cicored process or other direct reduction processes.

DRI smelting technology development continues to further optimize the process for customer-specific feed materials and to complement Metso Outotec's Planet Positive offering for decarbonization of iron and steel industry.

Metso Outotec's DRI Smelting Furnace provides the following benefits:

- Flexibility for any DRI feed;
- High productivity with capacity above 1.2 million tonnes annually;
- Continuous production of hot metal with high availability and long campaign life;
- Capable of handling large slag volumes;
- Possibility to change slag chemistry to achieve high iron yields and good-quality slag;
- Minimal changes to existing steel plant; and
- Furnace off-gas can be used as energy or in a carbon

Primetals Tangshan Technology Services extend the thin-slab caster service contract

Chinese steel producer Tangshan Quanfeng has signed a maintenance services contract with Primetals Tangshan Technology Services (PTTS). Over the last three years, PTTS has provided Quanfeng with high-quality offline services for the entire thin-slab caster at its plant located in Tangshan, Hebei province, China. The services have included the refurbishment of segments and rollers.

Higher productivity

Thanks to the quality of the maintenance work, Quanfeng

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- Reverse Buyer Seller Meet
- Participation from Central Government, Ministries and State Governments
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- Steel Industry Stakeholders
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- Machinery & Technology for Mineral Mining & Processing
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could achieve higher productivity, develop additional steel grades, and produce steels of higher quality. Therefore, Quanfeng has now decided to extend the contract for another three years. With hundreds of experienced workers and experts in the field of metallurgical services, PTTS will provide maintenance services for the entire thin-slab caster.

Key equipment from Primetals Technologies

Established in 2018, Tangshan Quanfeng is owned by Donghua Steel, a part of the larger Shuangying Group. Donghua Steel has an annual capacity of 5.5 million tons of liquid steel and produces high-strength rebar for the domestic and international markets. Its thin-slab caster features key equipment and process control systems from Primetals Technologies.

Comprehensive service offering

PTTS was established in 2017 and is a joint venture between Primetals Technologies and HBIS Tangsteel. It is headquartered in Tangshan and has operations in several locations in China. PTTS provides comprehensive services in off-line maintenance, equipment refurbishment, condition monitoring, and operational support for slab casters.

SKF in India marks its 100th-anniversary milestone

SKF India which is the leading technology and solutions provider of bearing and units, seals, lubrication, condition monitoring and services *celebrating a century of quality, innovation, leadership, and nation-building.*

SKF started in India in 1923, with a trading office in Kolkata. Over the years, SKF's presence in the country has grown to include six manufacturing units, eight distribution centres and four solutions factories, along with a nationwide supplier and distributor network. Additionally, SKF has in India a Global Technical Center for end-to-end engineering and technology solutions.

In celebration of this major milestone, SKF unveiled the centennial logo under the theme of "Towards an Intelligent and Clean future", to emphasize the focus on developing technologies and solutions that help customers strive for sustainability.

Manish Bhatnagar, Managing Director, SKF India Ltd. remarked, "This is truly a historic milestone for us. Since our inception, we have played a decisive role in shaping industries and societies with our products and solutions. We take great pride in the role we have played in helping customers overcome friction and minimize waste. We are equally proud of the long-term value we have created for our stakeholders over the past years while investing in our communities and providing opportunities for growth. We envision an intelligent and clean future for our new and existing customers, wider reach in different industries and playing an important role in nation-building. Using our technical expertise, vast portfolio, and long-standing experience, we will continue to help industries transition to a cleaner world."

A mega celebratory event will be organized for employees along with a centennial gala dinner for customers, suppliers, distributors, and other external stakeholders on March 11 in Pune. The celebrations will continue throughout the year with special roadshows and activities, and employee celebrations across locations.

As a leading supplier of bearings and other services, SKF works with customer across more than 25 industries in India. With its new strategic framework, SKF in India is well-positioned to drive sustainable and profitable growth and provide customer value by focusing on high-growth segments, accelerating technology development in prioritized industries, and increasing the pace of regionalization.

"On behalf of the leadership, I want to acknowledge our customers, partners, shareholders, and everyone who have been an integral part of this journey and have contributed to the growth of SKF in India over the last century. I look forward to their continued confidence and trust as we work to build the foundation for the next century and beyond," Mr Bhatnagar concluded.

About the 100th Anniversary of SKF in India

The story of SKF in India is a story of quality, innovation, and leadership – we evolved from a pioneer ball-bearing manufacturer to a knowledge-driven engineering company providing reliable rotation across industries. But most of all, it's a story of nation-building – helping industries to achieve breakthroughs in friction reduction, by providing opportunities for employment, building meaningful relationships and partnering with India on its growth path.

SKF's mission is to be the undisputed leader in the bearing

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business. We do this by offering solutions that reduce friction and CO2 emissions, whilst at the same time increasing machine uptime and performance. Our products and services around the rotating shaft, include bearings, seals, lubrication management, artificial intelligence and wireless condition monitoring. SKF is represented in more than 130 countries and has around 17,000 distributor locations worldwide. Annual sales in 2021 were SEK 81 732 million and the number of employees was 42,602. www.skf.com/in

ArcelorMittal CEO says decarbonisation would drive steel prices up 10%-20%

Stripping out carbon from steel production would drive up prices by about 10%-20%, the chief executive officer ArcelorMittal (MT.LU) said on Thursday, saying this could make green producers' business model inviable.

The global steel industry is one of the most energy-intensive industries worldwide, accounting for approximately 8% of global annual carbon dioxide emissions, and it is under pressure to cut back.

In our preliminary estimates...the cost to decarbonise steel is not so prohibitive, so the system could take it. I think the cost of steel would go up 10 to 20%," said Aditya Mittal at a World Trade Organization event, adding that this would drive up the cost of an average car by around $100-$200.

"But again, 10 to 20% for the steel industry is a lot because we have low margins. ...If someone comes in and undercuts, then steel companies which are producing decarbonized steel will not have a viable business mode," he added.

Using renewable power will foster steel decarbonisation

In a steely affair amongst the steel specialists across the country ably organised by FIRST Construction Council, the 6th edition of 'MAKE IN STEEL' Conference & Awards 2023, in association with Construction World & Infrastructure Today magazines, was held on February 10, 2023.

In 2018 it was estimated that each tonne of steel produced, emitted an average of 1.85 tonnes of carbon dioxide, equating to about 8% of global carbon dioxide emissions. Today, all the steel players across the globe along with Indian counterparts are increasingly facing the decarbonisation challenge...

Terrence Busuttil, Director, ConstructSteel, World Steel Association (WorldSteel) shared a global perspective of steel with the audience. In his keynote remarks, he claimed, "We expect the steel construction industry to grow by around 2% as the rate of urbanisation growth and the growing rate of domestic products around the world are generating an increase in construction. The additional factor post-COVID is related to the energy transition, as we move away from fossil fuel to renewable energy sources used for construction. When we look at buildings driven by urbanisation and population, infrastructure structure is further developed, and this is a megatrend that we see in construction today. This allows the steel industry to position itself in a market that is growing over time. However, the share of the steel market in construction is not high. We escalate it at about 25%, and it is very low in general across all markets."..

Prabodha Acharya, Chief Sustainability Officer, JSW Steel was highly vocal while giving the Indian perspective of emissions, stating "According to the government of India, for primary steel production, last year the average reading of emission level was 2.55 tonne of carbon dioxide per tonne of crude steel. That amounts to almost 300 million tonne of carbon emissions last year in India. Even if we reduce the emission intensity by 20% by 2030, still our CO2 emission will be 500 million tonne. And when we reach 2050 at the same pace, the emission figure is going to be too high."

He opined that "By 2050 it is improbable to achieve net zero targets. With the currently known technology and the advent of expected technologies, we still will be dealing with emissions of around 25 million tonnes even by 2070". While giving his expert advice on decarbonisation v/s growth theme, Dr. Mukesh Kumar, Sr. Advisor, JSP Group stated, "It has to be seen on an apple-to-apple basis as we are comparing Europe with India. In India, regeneration has not started yet. Our scrap aggregate is only around 22-24 million tonnes whereas the world market is huge. All international players are heading towards decarbonisation by using renewable power generation."..

On sharing his experience of working with the ministry in the past five years, he stated that "By 2047, the steel demand will be around 500 million tonnes, but the steel scrap availability will never go beyond 120 million tonnes. I feel all the ministries like steel, MNRE, external affairs, finance need to ensure that the India steel industry's interest is not damaged, but is protected."..

RK Vijayavergia, Consultant, SRTMI & Ex-Executive Director (Operations), SAIL on the back of his vast experience stated that "To head in the right direction towards achieving net-zero, firstly we need technology to avoid the emission, and secondly, to manage emission in such a way that we prevent th..

Speaking on the sustainability of steel, Deepak Vaidya, Business Head, Outokumpu appealed to the audience stating, "It is not only about the technology used for producing steel that is going to help us. Working on

sustainability is the moral responsibility of all the stakeholders involved. In India, we should also consider small-scale hydro plants to produce electricity used for producing steel."

Touching upon the ideal choice of material in construction, Shailesh Bhandari, Managing Director, Electrotherm India stated, "The total cost of the project will not go up by more than 1-2% if epoxy-coated bars are used on the construction.Tthe government has made it mandatory in all the coastal areas in the state of Gujarat to use epoxy-coated bars. Even in the Mumbai metro rail project, there is a lot of consumption of epoxy-coated bars. In the future, to reduce the carbon footprint, the only way we can decrease this is by decreasing the consumption of steel during the refurbishment process."

The man involved in the making of the Chenab Bridge, Shashank Rajbhoj, AGM-Design, Afcons Infrastructure commented, "I have witnessed that the government is more inclined towards concrete structures. But for sea bridge projects having around 500-metre long span, erecting them in steel is more economical option. We should promote steel works in such cases, as we can avoid the foundation work being done in rivers and sea.

China to Cut Steel Output for Third Year to Hit Green Goals

China will again cut annual crude steel production in 2023, according to a person familiar with the decision, marking the third year in a row that the government has mandated reduced output in order to rein in carbon emissions from the heavily polluting sector.

China is the world's biggest producer and consumer of the alloy, which is the backbone of its industrial economy. Since output hit a record of 1.053 billion tons in 2020, it has declined each year to remain just above 1 billion tons. The sector accounts for about 15% of national emissions, second only to electricity generation.

As part of the plan, the government will also ban new steelmaking capacity, the person said, declining to be named when discussing policy. China's economic planning agency, the National Development and Reform Commission, didn't immediately respond to a request for comment.

While Beijing continues to employ large-scale stimulus to buttress economic growth, the proportion of steel used is declining as the economy transitions to less-metals intensive infrastructure. The government's crackdown on the property market has also sapped demand for the alloy.

Some of the world's biggest miners, from BHP Group in Australia to Vale SA in Brazil, rely on China's steel mills to consume the vast quantities of iron ore they produce, so less demand is likely to weigh on their earnings. Both BHP and rival miner Rio Tinto Plc fell 1.1% in London.

Chinese 'steel production climbed 5.6% in the first two months of the year to 169 million tons, although Beijing's relatively modest targets for growth in 2023, unveiled at its annual legislative meeting earlier in March, have dented expectations of a big increase in demand.

— With assistance by Jason Rogers

January 2023 crude steel production

World crude steel production for the 63 countries reporting to the World Steel Association (worldsteel) was 145.3 million tonnes (Mt) in January 2023, a 3.3% decrease compared to January 2022.

Crude steel production by region

Africa produced 1.2 Mt in January 2023, down 4.9% on January 2022. Asia and Oceania produced 107.5 Mt, down 0.2%. The EU (27) produced 10.3 Mt, down 15.2%. Europe, Other produced 3.3 Mt, down 17.5%. The Middle East produced 3.8 Mt, up 19.7%. North America produced 9.1 Mt, down 5.6%. Russia & other CIS + Ukraine produced 6.5 Mt, down 24.9%. South America produced 3.6 Mt, down 0.6%.

Table 1. Crude steel production by region

	Jan 2023 (Mt)	% change Jan 23/22	Jan-Jan 2023 (Mt)	% change Jan Jan 23/22
Africa	1.2	-4.9	1.2	-4.9
Asia and Oceania	107.5	-0.2	107.5	-0.2
EU (27)	10.3	-15.2	10.3	-15.2
Europe, Other	3.3	-17.5	3.3	-17.5
Middle East	3.81	9.7	3.8	19.7
North America 5.6	9.1	-5.6	9.1	-
Russia & other CIS + Ukraine	6.5	-24.9	6.5	-24.9
South America	3.6	-0.6	3.6	-0.6
Total 63 countries	145.3	-3.3	145.3	-3.3

The 63 countries included in this table accounted for approximately 97% of total world crude steel production in 2022. Regions and countries covered by the table:

- Africa: Egypt, Libya, South Africa, Tunisia
- Asia and Oceania: Australia, China, India, Japan, Mongolia, New Zealand, Pakistan, South Korea, Taiwan (China), Thailand, Viet Nam
- European Union (27)
- Europe, Other: Macedonia, Norway, Serbia, Türkiye, United Kingdom
- Middle East: Iran, Qatar, Saudi Arabia, United Arab Emirates
- North America: Canada, Cuba, El Salvador, Guatemala, Mexico, United States
- Russia & other CIS + Ukraine: Belarus, Kazakhstan, Russia, Ukraine
- South America: Argentina, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela

Top 10 steel-producing countries

China is estimated to have produced 79.5 Mt in January 2023, up 2.3% on January 2022. India produced 10.9 Mt, down 0.2%. Japan produced 7.2 Mt, down 6.9%. The United States produced 6.5 Mt, down 6.8%. Russia is estimated to have produced 5.8 Mt, down 8.9%. South Korea produced 5.5 Mt, down 9.8%. Germany produced 2.9 Mt, down 10.2%. Brazil produced 2.8 Mt, down 4.9%. Iran is estimated to have produced 2.7 Mt, up 27.7%. Türkiye produced 2.6 Mt, down 17.6%.

Table 2. Top 10 steel-producing countries

	Jan 2023 (Mt)	% change Jan 23/22	Jan-Jan 2023 (Mt)	% change Jan -Jan 23/22
China	79.5 e	2.3	79.5	2.3
India	10.9	-0.2	10.9	-0.2
Japan	7.2	-6.9	7.2	-6.9
United States	6.5	-6.8	6.5	-6.8
Russia	5.8e	-8.9	5.8	-8.9
South Korea	5.5	-9.8	5.5	-9.8
Germany	2.9	-10.2	2.9	-10.2
Brazil	2.8	-4.9	2.8	-4.9
Iran	2.7 e	27.7	2.7	27.7
Türkiye	2.6	-17.6	2.6	-17.6

e – estimated. Ranking of top 10 producing countries is based on year-to-date aggregate

The World Steel Association (worldsteel) is one of the largest and most dynamic industry associations in the world, with members in every major steel-producing country. worldsteel represents steel producers, national and regional steel industry associations, and steel research institutes. Members represent around 85% of global steel production.

Domestic Automobile sales up by 10%; export declines by 35%: SIAM Data

Indian automakers dispatched nearly 2.92 lakh passenger vehicles, the highest ever for February, driven by strong demand for cars and utility vehicles, industry body SIAM said on Friday.

Last month, the total passenger vehicle dispatches from companies to dealers increased 11% to 2,91,928 units from 2,62,984 units in February 2022.

Passenger car sales rose to 1,42,201 units in February against 1,33,572 units in the year-ago period. Similarly, utility vehicle dispatches, including sports utility vehicles, rose to 1,38,238 units compared to 1,20,122 units in February 2022.

The Union Budget led to an increase in car sales as 2,91,928 units of passenger vehicles were sold in February 2023 versus 2,62,984 units sold in the same period last year. Maruti Suzuki sold 1,02,565 units in February this year versus 99,398 units in the corresponding period last year. Hyundai Motor was the closest competitor with sales of 24,493 units in February 2023 versus sales of 21,501 units in February 2022, as per the latest Society of Indian Automobile Manufacturers (SIAM) data.

34,61,716 passenger vehicles were sold in April-February 2022-23 whereas 26,66,109 passenger units were sold in April-February 2021-22. During this period in 2022-23, Maruti Suzukisold 10,25,836 units of passenger vehicles whereas Hyundai Motor sold 2,42,436. In the same period last year, Maruti Suzuki sold 8,32,873 units of passenger vehicles whereas Hyundai Motor sold 2,08,835 units.

SIAM President Vinod Aggarwal attributed the rise in sales to the encouraging provisions in the Union Budget 2023-24 for consumers. Aggarwal said, “Overall positive sentiments in the market continue, which is also driven by encouraging announcements at the Union Budget for consumers. Auto Industry is fully geared up for the transition to Phase 2 of BS 6 Emission Norms for all categories of vehicles from next month” However, he sounded a cautionary note with regards to the hike in repo rate by the Reserve Bank of India (RBI) and higher cost of borrowings and also urged the government to ensure the moderation of CNG prices.

Aggarwal noted, “Hike in Repo Rates in February, which would result in higher cost of borrowings, remains a concern and we hope that the rates would get moderated suitably. Moderation of CNG Fuel Prices is also important for expanding the footprint of Gas Based Mobility which is critical for Sustainable Mobility.”

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SIAM

Segment wise Comparative Production, Domestic Sales & Exports data for the month of February 2023

(Number of Vehicles)

Category / Segment/Subsegment	Production February		Domestic Sales February		Exports February	
	2022	2023	2022	2023	2022	2023
Passenger Vehicles (PVs)*						
Passenger Cars	1,70,428	1,69,826	1,33,572	1,42,201	33,515	25,207
Utility Vehicles (UVs)	1,33,246	1,56,333	1,20,122	1,38,238	17,623	21,139
Vans	9,368	11,550	9,290	11,489	75	140
Total Passenger Vehicles (PVs)	**3,13,042**	**3,37,709**	**2,62,984**	**2,91,928**	**51,213**	**46,486**
Three Wheelers						
Passenger Carrier	53,693	56,978	18,144	38,777	34,820	19,386
Goods Carrier	8,659	8,191	7,535	8,711	1,177	254
E-Rickshaw	1,512	2,516	1,249	2,615	-	-
E-Cart	148	407	146	279	-	-
Total Three Wheelers	**64,012**	**68,092**	**27,074**	**50,382**	**35,997**	**19,640**
Two Wheelers						
Scooter/ Scooterettee	3,93,635	4,40,901	3,56,222	3,91,054	24,830	33,378
Motorcycle/Step-Throughs	9,98,438	8,72,062	6,58,009	7,03,261	3,49,221	2,01,097
Mopeds	38,455	35,706	35,848	35,346	1,638	612
Total Two Wheelers	**14,30,528**	**13,48,669**	**10,50,079**	**11,29,661**	**3,75,689**	**2,35,087**
Quadricycle	**140**	**452**	**10**	**107**	**126**	**348**
Grand Total	**18,07,722**	**17,54,922**	**13,40,147**	**14,72,078**	**4,63,025**	**3,01,561**
* BMW, Mercedes, Tata Motors and Volvo Auto data is not available						
Society of Indian Automobile Manufacturers (10/03/2023)						

SIAM

Summary Report: Cumulative Production, Domestic Sales & Exports data for the period of April - February 2023

Report I

(Number of Vehicles)

Category / Segment/Subsegment	Production April-February		Domestic Sales April-February		Exports April-February	
	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23
Passenger Vehicles (PVs)*						
Passenger Cars	16,37,364	19,72,794	12,90,030	15,78,963	3,34,450	3,72,498
Utility Vehicles (UVs)	14,56,164	19,77,381	12,73,090	17,57,160	1,79,795	2,20,119
Vans	1,04,638	1,26,605	1,02,989	1,25,593	1,746	457
Total Passenger Vehicles (PVs)	**31,98,166**	**40,76,780**	**26,66,109**	**34,61,716**	**5,15,991**	**5,93,074**
Three Wheelers						
Passenger Carrier	5,99,133	6,61,579	1,51,587	3,20,963	4,51,318	3,41,819
Goods Carrier	77,193	89,553	67,273	86,679	9,877	4,396
E-Rickshaw	9,162	24,641	9,298	23,936	-	-
E-Cart	1,099	3,055	1,092	2,830	-	-
Total Three Wheelers	**6,86,587**	**7,78,828**	**2,29,250**	**4,34,408**	**4,61,195**	**3,46,215**
Two Wheelers						
Scooter/ Scooterettee	40,50,505	51,13,161	37,37,975	47,52,401	3,28,601	3,74,014
Motorcycle/Step-Throughs	1,17,54,996	1,23,79,726	81,97,707	94,14,380	37,53,043	30,29,006
Mopeds	4,38,622	3,99,946	4,35,501	4,04,753	10,246	3,528
Total Two Wheelers	**1,62,44,123**	**1,78,92,833**	**1,23,71,183**	**1,45,71,534**	**40,91,890**	**34,06,548**
Quadricycle	**4,038**	**2,356**	**75**	**620**	**4,314**	**1,854**
Grand Total	**2,01,32,914**	**2,27,50,797**	**1,52,66,617**	**1,84,68,278**	**50,73,390**	**43,47,691**
* BMW, Mercedes, Volvo Auto data is not available and Tata Motors data is available for Apr-Dec only						
Society of Indian Automobile Manufacturers (10/03/2023)						

SIAM

Category & Company wise Summary Report for the month of February 2023 and Cumulative for April-February 2023

Report II

(Number of Vehicles)

Category / Segment/Subsegment / Manufacturer	Production February		Production April-February		Domestic Sales February		Domestic Sales April-February		Exports February		Exports April-February	
	2022	2023	2021-22	2022-23	2022	2023	2021-22	2022-23	2022	2023	2021-22	2022-23
Passenger Vehicles (PVs)												
FCA India Automobiles Pvt Ltd	1,394	1,000	16,479	16,387	1,020	917	10,976	11,466	380	630	6,449	4,912
Force Motors Ltd	99	42	493	663	78	60	576	677	1	1	2	6
Ford India Private Ltd	NA	NA	30,337	NA	NA	NA	15,678	NA	NA	NA	12,022	NA
Honda Cars India Ltd	5,883	9,635	96,234	1,06,687	7,137	6,086	70,020	84,726	2,337	969	17,054	19,521
Hyundai Motor India Ltd	53,000	55,401	5,51,300	6,47,478	44,050	47,001	4,36,900	5,16,946	9,109	10,850	1,18,973	1,42,119
Isuzu Motors India Pvt Ltd	333	99	1,968	1,971	30	66	732	657	24	-	255	355
Kia Motors India Pvt Ltd	22,774	30,309	2,08,629	3,29,388	16,121	24,000	1,84,795	2,47,728	6,504	7,400	45,337	79,554
Mahindra & Mahindra Ltd	24,041	30,978	2,07,467	3,30,225	27,663	30,358	1,98,292	3,23,256	1,116	1,408	9,359	9,659
Maruti Suzuki India Ltd	1,85,672	1,56,438	14,60,120	17,27,981	1,33,048	1,47,437	11,97,697	14,74,107	23,787	15,056	2,09,487	2,26,110
MG Motor India Pvt Ltd	4,038	4,327	36,410	40,857	4,528	4,103	35,848	42,815	-	-	32	12
Nissan Motor India Pvt Ltd	5,179	7,253	68,749	87,375	2,456	2,184	24,877	30,351	4,207	3,882	34,026	53,378
PCA Motors Pvt. Ltd	51	373	777	7,129	59	328	725	7,047	-	-	-	-
Renault India Pvt Ltd	7,986	10,102	96,772	1,11,170	6,599	6,618	78,957	75,537	1,936	1,537	20,748	29,471
SkodaAuto India Pvt Ltd	4,543	4,225	30,133	51,561	4,603	3,416	28,354	47,637	-	116	-	406
Tata Motors Ltd*	NA	NA	2,48,800	4,09,179	NA	NA	2,45,249	4,08,087	NA	NA	1,581	1,786
Toyota Kirloskar Motor Pvt Ltd	8,976	22,228	63,974	1,36,407	6,745	15,323	1,06,830	1,54,758	34	1,974	125	2,197
Volkswagen India Pvt Ltd	5,117	5,334	69,025	62,327	4,078	3,311	28,229	37,382	2,760	755	38,101	23,908
Total Passenger Vehicles (PVs)	**3,13,042**	**3,37,709**	**31,98,166**	**40,76,780**	**2,62,984**	**2,91,928**	**26,66,109**	**34,61,716**	**51,213**	**46,486**	**5,15,991**	**5,93,074**

*Only cumulative data is available for Apr-Dec — Note: Not Available

SIAM

Category & Company wise Summary Report for the month of February 2023 and Cumulative for April-February 2023

Report II

(Number of Vehicles)

Category	Production				Domestic Sales				Exports			
Segment/Subsegment	February		April-February		February		April-February		February		April-February	
Manufacturer	2022	2023	2021-22	2022-23	2022	2023	2021-22	2022-23	2022	2023	2021-22	2022-23
Three Wheelers												
Atul Auto Ltd	1,477	1,810	14,946	22,582	1,220	1,937	13,096	19,906	170	188	1,532	2,597
Bajaj Auto Ltd	36,091	42,749	4,19,957	4,35,555	18,214	32,849	1,40,977	2,65,679	23,333	11,566	2,25,347	1,72,100
Continental Engines Pvt Ltd	632	282	3,897	3,842	475	297	3,748	5,743	-	-	-	-
Force Motors Ltd	166	350	3,175	2,602	-	-	-	-	196	196	2,562	2,680
Mahindra & Mahindra Ltd	4,013	5,196	25,537	50,493	3,812	5,250	26,006	52,675	5	-	373	485
Piaggio Vehicles Pvt. Ltd	5,775	6,137	59,327	55,455	4,405	8,606	37,533	75,225	2,176	(51)	21,721	23,614
TVS Motor Company Ltd	14,858	9,568	1,59,668	1,59,479	942	1,243	7,545	14,740	15,147	7,781	1,49,290	1,44,781
Total Three Wheelers	**84,012**	**88,092**	**8,86,587**	**7,78,828**	**27,074**	**50,382**	**2,29,250**	**4,34,408**	**35,997**	**19,840**	**4,81,196**	**3,48,215**
Two Wheelers												
Ather Energy Pvt. Ltd	2,245	12,092	20,128	81,356	2,178	12,177	20,631	80,658	-	-	-	-
Bajaj Auto Ltd	2,55,049	2,64,310	35,20,214	32,05,972	96,523	1,18,039	15,34,002	16,46,185	1,82,814	1,16,021	20,46,529	15,42,241
Chetak Technology Ltd	-	500	-	5,335	-	2,296	-	4,434	-	-	-	-
Hero MotoCorp Ltd	3,35,484	3,68,853	44,05,549	47,68,044	3,31,462	3,82,317	42,27,782	46,50,065	28,792	12,140	2,66,232	1,56,140
Honda Motorcycle & Scooter India Pvt Ltd	3,17,803	3,25,465	34,44,791	40,87,479	2,55,708	2,27,604	31,19,301	39,27,955	28,944	20,111	3,15,058	3,10,991
India Kawasaki Motors Pvt Ltd	192	516	3,148	3,645	352	375	3,460	3,647				
India Yamaha Motor Pvt Ltd	62,291	55,606	5,60,665	7,78,833	54,817	39,397	4,35,891	5,24,975	22,275	15,684	2,40,776	2,51,425
Mahindra Two Wheelers Ltd	-	-	-	72	-	-	3	98	-	-	-	-
Okinawa Autotech Pvt Ltd	9,880	5,166	69,556	52,550	9,907	6,726	68,347	35,595	-	-	773	78
Piaggio Vehicles Pvt Ltd	6,365	4,824	70,002	58,159	5,100	2,900	48,742	41,155	1,815	1,216	22,524	16,632
Royal-Enfield (Unit of Eicher Motors)	57,005	68,490	5,28,087	7,58,195	52,135	64,436	4,62,766	6,74,956	7,025	7,108	71,832	57,704
Suzuki Motorcycle India Pvt Ltd	72,121	86,097	8,87,818	8,56,179	66,605	82,469	8,68,091	8,57,987	13,097	18,170	1,30,349	1,93,100
Triumph Motorcycles India Pvt Ltd	68	52	658	598	98	87	1,152	979	-	-	-	-
TVS Motor Company Ltd	2,77,714	2,60,741	28,36,004	31,95,244	1,73,198	2,21,402	18,80,608	23,57,156	94,427	45,624	9,94,177	8,48,230
Total Two Wheelers	**14,30,528**	**13,48,669**	**1,62,44,123**	**1,78,92,833**	**10,50,079**	**11,29,661**	**1,23,71,183**	**1,45,71,534**	**3,75,689**	**2,35,087**	**40,91,890**	**34,06,548**
Quadricycle												
Bajaj Auto Ltd	140	452	4,038	2,358	10	107	75	620	126	348	4,314	1,854
Total Quadricycle	**140**	**452**	**4,038**	**2,358**	**10**	**107**	**75**	**620**	**126**	**348**	**4,314**	**1,854**
Grand Total	**18,07,722**	**17,54,922**	**2,01,32,914**	**2,27,50,797**	**13,40,147**	**14,72,078**	**1,52,66,617**	**1,84,88,278**	**4,63,026**	**3,01,581**	**50,73,390**	**43,47,691**

Society of Indian Automobile Manufacturers (SIAM)2023

SIAM

Segment & Company wise Production, Domestic Sales & Exports Report for the month of February 2023 and Cumulative for April-February 2023

Report III

(Number of Vehicles)

Category	Production				Domestic Sales				Exports			
Segment/Subsegment	February		April-February		February		April-February		February		April-February	
Manufacturer	2022	2023	2021-22	2022-23	2022	2023	2021-22	2022-23	2022	2023	2021-22	2022-23
Passenger Vehicles (PVs)												
A: Passenger Cars												
Ford India Private Ltd	NA	NA	5,565	NA	NA	NA	2,005	NA	NA	NA	2,640	NA
Honda Cars India Ltd	8,375	9,245	89,846	1,00,807	6,698	6,085	73,185	79,785	2,295	854	16,304	18,878
Hyundai Motor India Ltd	27,800	30,565	2,87,278	3,45,639	21,501	24,495	2,08,535	2,42,436	5,267	5,822	80,988	99,817
Mahindra & Mahindra Ltd	-	-	-	-	12	-	53	274	-	-	2	-
Maruti Suzuki India Ltd	1,23,292	1,18,357	10,28,668	12,50,320	99,398	1,02,585	8,32,873	10,26,326	19,127	13,468	1,62,947	1,84,087
Nissan Motor India Pvt Ltd	2,327	4,425	28,815	44,318	239	-	2,005	-	3,117	3,765	26,486	43,490
Renault India Pvt Ltd	2,342	2,663	32,022	29,116	1,924	1,758	24,074	18,215	504	543	9,411	8,880
SkodaAuto India Pvt Ltd	1,957	1,777	8,842	25,165	2,129	1,448	9,158	23,500	-	-	-	-
Tata Motors Ltd*	NA	NA	1,05,665	1,35,198	NA	NA	1,05,225	1,35,177	NA	NA	366	150
Toyota Kirloskar Motor Pvt Ltd	135	76	903	874	161	4,290	20,176	37,292	-	-	-	-
Volkswagen India Pvt Ltd	4,408	2,973	49,596	32,357	1,510	1,563	12,459	16,502	2,203	755	24,306	17,408
Total A: Passenger Cars	**1,70,428**	**1,69,826**	**18,37,384**	**19,72,794**	**1,33,572**	**1,42,201**	**12,90,030**	**15,78,963**	**33,515**	**25,207**	**3,34,460**	**3,72,498**
B: Utility Vehicles (UVs)												
FCA India Automobiles Pvt Ltd	1,354	1,000	15,472	15,387	1,020	917	10,575	11,765	350	630	5,449	4,512
Force Motors Ltd	95	42	492	653	78	60	578	677	1	1	2	5
Ford India Private Ltd	NA	NA	33,742	NA	NA	NA	13,872	NA	NA	NA	15,382	NA
Honda Cars India Ltd	510	590	6,322	5,880	489	-	5,835	4,941	42	116	780	943
Hyundai Motor India Ltd	25,400	26,036	2,63,622	3,05,839	22,949	22,508	2,28,955	2,74,610	2,842	5,028	37,886	42,508
Isuzu Motors India Pvt Ltd	333	66	1,968	1,971	30	66	702	657	24	-	255	355
Kia Motors India Pvt Ltd	22,774	30,309	2,08,625	3,29,399	18,121	24,600	1,64,165	2,47,728	5,804	7,406	45,337	79,554
Mahindra & Mahindra Ltd	23,882	30,858	2,04,740	3,27,872	27,651	30,221	1,96,502	3,20,985	1,047	1,373	8,701	9,800
Maruti Suzuki India Ltd	33,197	26,651	3,34,452	3,47,123	25,360	22,650	2,66,700	3,29,075	4,654	3,383	44,575	41,717
MG Motor India Pvt Ltd	4,058	4,327	36,410	49,857	4,628	4,195	35,845	42,515	-	-	32	12
Nissan Motor India Pvt Ltd	2,852	2,828	39,924	43,057	2,217	2,184	32,866	30,351	1,050	117	7,542	9,888
PCA Motors Pvt. Ltd	57	373	777	7,129	59	328	723	7,047	-	-	-	-
Renault India Pvt Ltd	5,844	7,439	64,745	82,054	4,644	4,858	54,883	65,322	1,422	994	11,335	20,597
SkodaAuto India Pvt Ltd	2,592	2,445	21,260	25,396	2,374	1,972	19,156	24,327	-	118	-	405
Tata Motors Ltd*	NA	NA	1,40,964	2,70,261	NA	NA	1,42,095	2,68,570	NA	NA	899	1,535
Toyota Kirloskar Motor Pvt Ltd	6,847	22,150	68,065	1,57,533	5,584	11,055	86,574	1,17,506	24	1,974	126	2,197
Volkswagen India Pvt Ltd	3,709	2,476	19,429	29,970	2,518	1,748	15,740	20,574	563	-	1,795	6,500
Total B: Utility Vehicles (UVs)	**1,33,248**	**1,56,333**	**14,66,184**	**19,77,381**	**1,20,122**	**1,38,236**	**12,73,090**	**17,57,160**	**17,823**	**21,139**	**1,79,796**	**2,20,119**
C: Vans												
Mahindra & Mahindra Ltd	179	120	2,727	2,353	100	137	1,937	2,057	69	35	666	59
Maruti Suzuki India Ltd	9,189	11,430	1,00,000	1,20,538	9,190	11,352	99,124	1,19,196	6	105	964	318
Tata Motors Ltd*	NA	NA	1,911	3,712	NA	NA	1,925	4,340	NA	NA	116	80
Total C: Vans	**9,368**	**11,550**	**1,04,638**	**1,26,603**	**9,290**	**11,489**	**1,02,989**	**1,26,593**	**75**	**140**	**1,746**	**457**
Total Passenger Vehicles (PVs)	**3,13,042**	**3,37,709**	**31,98,186**	**40,76,780**	**2,62,984**	**2,91,926**	**26,66,109**	**34,61,716**	**51,213**	**48,486**	**5,15,991**	**5,93,074**

*Data not available

Statistics

SIAM

Segment & Company wise Production, Domestic Sales & Exports Report for the month of February 2023 and Cumulative for April-February 2023

Report III

(Number of Vehicles)

Category	Production				Domestic Sales				Exports			
Segment/Subsegment	February		April-February		February		April-February		February		April-February	
Manufacturer	2022	2023	2021-22	2022-23	2022	2023	2021-22	2022-23	2022	2023	2021-22	2022-23
Two Wheelers												
A: Scooter/ Scooterettes												
Ather Energy Pvt. Ltd	2,245	[illegible]2,092	20,129	61,356	2,178	12[illegible]47	20,834	59,655	-	-	-	-
Bajaj Auto Ltd	947	2,027	8,941	29,804	1,110	362	7,181	25,359				5
Chetak Technology Ltd	-	500	-	5,335	-	2,296	-	4,434	-	-	-	-
Hero MotoCorp Ltd	17,958	24,714	2,95,153	3,40,296	19,298	22[illegible]52	2,52,531	3,27,297	502	454	9,319	8,654
Honda Motorcycle & Scooter India Pvt Ltd	1,90,225	1,93,969	19,52,[illegible]4	23,78,100	[illegible],83,690	1,88,[illegible]27	18,09,221	22,32,120	13,958	13,386	[illegible],81,951	[illegible],73,664
India Yamaha Motor Pvt. Ltd	20,110	[illegible]0,380	2,20,377	1,92,628	14,771	8[illegible]96	1,90,244	1,69,415	[illegible],965	1,212	38,071	28,735
Okinawa Autotech Pvt. Ltd	9,863	6,163	39,856	92,650	9,907	6,728	58,347	95,586	-	-	110	78
Piaggio Vehicles Pvt Ltd	6,385	4,874	70,002	56,139	5,100	2,900	48,135	41,148	[illegible],816	1,716	22,824	16,802
Suzuki Motorcycle India Pvt Ltd	59,210	74,081	5,75,533	7,27,499	56,530	50,486	5,37,[illegible]95	6,39,449	3,654	6,956	42,908	74,078
TVS Motor Company Ltd	96,714	1[illegible]2,148	8,[illegible]47,070	[illegible]2,05,954	83,678	96,552	7,74,[illegible]76	11,32,940	2,938	8,173	58,415	72,168
Total A: Scooter/ Scooterettes	**3,93,635**	**4,40,901**	**40,50,505**	**51,13,161**	**3,56,222**	**3,91,054**	**37,37,975**	**47,62,401**	**24,850**	**33,378**	**3,26,801**	**3,74,014**
B: Motorcycle/Step-Throughs												
Bajaj Auto Ltd	2,94,102	2,52,283	35,13,273	31,76,008	95,413	1,17,657	15,26,522	16,20,636	1,62,814	1,15,021	20,46,529	15,42,236
Hero MotoCorp Ltd	3,[illegible]7,556	3,44,130	41,09,306	44,27,748	3,12,104	3,60,[illegible]65	39,48,[illegible]31	40,25,772	26,200	11,680	2,56,910	[illegible],47,486
Honda Motorcycle & Scooter India Pvt Ltd	1,37,577	5[illegible],498	14,92,347	[illegible]7,09,029	[illegible],22,356	37,957	13,50,950	15,54,685	12,986	8,746	[illegible],57,107	[illegible],37,397
India Kawasaki Motors Pvt Ltd	192	518	5,149	5,848	352	575	3,480	3,647				
India Yamaha Motor Pvt. Ltd	42,187	45,225	4,40,488	5,87,205	20,046	31,211	2,45,547	3,55,555	20,312	14,482	2,02,705	2,32,633
Mahindra Two Wheelers Ltd	-	-	-	72	-	-	5	98	-	-	-	-
Piaggio Vehicles Pvt Ltd	-	-	-	-	-	-	7	9	-	-	-	-
Royal-Enfield (Unit of Eicher Motors)	61,005	53,790	5,28,087	[illegible],58,196	62,136	64,436	[illegible],62,766	6,74,955	[illegible],026	[illegible],108	[illegible],832	87,764
Suzuki Motorcycle India Pvt Ltd	[illegible]3,217	[illegible]1,973	1[illegible],286	1,28,679	2,073	1,998	21,928	[illegible]8,235	9,945	9,212	87,441	[illegible],09,022
Triumph Motorcycles India Pvt Ltd	38	52	658	598	98	97	1,152	970	-	-	-	-
TVS Motor Company Ltd	1,42,545	1[illegible],867	15,58,312	[illegible]5,86,044	53,372	66,404	6,40,851	[illegible]9,483	69,851	38,039	9,30,516	7,72,542
Total B: Motorcycle/Step-Throughs	**9,98,438**	**8,72,062**	**1,17,54,996**	**1,23,79,726**	**6,58,009**	**7,03,261**	**81,97,707**	**94,14,380**	**3,49,221**	**2,01,097**	**37,53,043**	**30,29,006**
C: Mopeds												
TVS Motor Company Ltd	38,455	35,705	4,38,622	3,99,946	35,848	35,348	4,35,501	4,04,753	[illegible],638	612	10,246	3,528
Total C: Mopeds	**38,455**	**35,705**	**4,38,622**	**3,99,946**	**35,848**	**35,348**	**4,35,501**	**4,04,753**	**1,638**	**612**	**10,246**	**3,528**
Total Two Wheelers	**14,30,528**	**13,48,668**	**1,62,44,123**	**1,78,92,833**	**10,50,079**	**11,29,661**	**1,23,71,183**	**1,45,71,534**	**3,75,689**	**2,35,087**	**40,91,890**	**34,06,548**
Quadricycle												
Bajaj Auto Ltd	140	452	4,038	2,356	10	[illegible]07	75	620	126	348	4,314	1,854
Total Quadricycle	**140**	**452**	**4,038**	**2,356**	**10**	**107**	**75**	**620**	**126**	**348**	**4,314**	**1,854**
Grand Total	18,07,722	17,54,922	2,01,32,914	2,27,50,797	13,40,147	14,72,078	1,52,66,617	1,84,68,278	4,83,025	3,01,561	50,73,390	43,47,691

Society of India[illegible] Automobile Manufacturers (SIAM)2023

SIAM

Sub-segment & Company wise Production, Domestic Sales & Exports Report for the month of February 2023 and Cumulative for April-February 2023

Report IV

(Number of Vehicles)

Category	Production				Domestic Sales				Exports			
Segment/Subsegment	February		April-February		February		April-February		February		April-February	
Manufacturer	2022	2023	2021-22	2022-23	2022	2023	2021-22	2022-23	2022	2023	2021-22	2022-23
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,Spresso)	24,286	[illegible]0,239	[illegible],33,[illegible]06	[illegible],67,040	19,691	[illegible]1,675	1,98,271	2,21,329	4,940	2,820	35,540	39,777
Renault India Pvt Ltd (Kwid)	2,342	2,563	32,023	29,[illegible]16	1,524	[illegible],758	24,074	18,215	504	543	9,411	8,880
Total Mini	**26,627**	**22,961**	**2,65,129**	**2,96,964**	**21,615**	**23,633**	**2,20,345**	**2,39,544**	**5,444**	**3,163**	**44,951**	**48,657**
Compact :Seats upto-5, Length Normally between 3600 - 4000 mm, Body Style-Sedan/Estate/Hatch/Notchback, Engine Displacement Normally upto 1.4 Litre												
Regular												
Ford India Private Ltd (Figo,Figo Aspire,Ford Freestyle)	NA	NA	5,595	NA	NA	NA	2,008	NA	NA	NA	2,340	NA
Honda Cars India Ltd (Amaze,Jazz)	3,805	4,029	39,950	49,057	3,862	4,123	39,249	[illegible]7,749	193	84	990	992
Hyundai Motor India Ltd (Aura,Grand i[illegible]10,Santro,Xcen	22,948	28[illegible]39	2,55,973	2,69,851	20,445	24,446	1,90,191	2,26,422	2,781	3,579	62[illegible]71	61,914
Maruti Suzuki India Ltd (OEM Models Baleno,Celerio,Dzi	95,968	97,277	7,72,978	9,67,8[illegible]3	77,795	79,898	5,22,567	7,91,197	13,102	9,775	1,26,[illegible]57	1,32,150
Nissan Motor India Pvt Ltd (Datsun GO,Datsun Redi-GO)	-	-	2,512	-	939	-	2,005	-	8	-	[illegible],103	-
Tata Motors Ltd* (Altroz, Tiago,Tigor)	NA	NA	[illegible],05,535	[illegible],35,182	NA	NA	1,05,226	1,35,177	NA	NA	366	150
Toyota Kirloskar Motor Pvt. Ltd (Glanza)	-	-	-	-	-	4,220	19,[illegible]10	36,401	-	-	-	-
Volkswagen India Pvt Ltd (Polo)	2,472	-	17,779	874	1,235	-	10,732	752	315	-	8,[illegible]37	1,095
Total Compact	**1,25,291**	**1,30,338**	**11,84,182**	**14,43,428**	**1,03,572**	**1,12,690**	**9,91,108**	**12,37,390**	**16,329**	**13,439**	**1,86,121**	**1,95,301**
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)					12		53	214			2	
Total Super Compact	-	-	-	-	12	-	53	214	-	-	2	-
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)	2,468	4,330	60,[illegible]96	61,150	2,903	[illegible],060	33,0[illegible]3	32,345	2,152	770	[illegible]5,304	17,865
Hyundai Motor India Ltd (Verna)	4,654	2,226	47,227	53,753	1,558	47	18,456	16,014	3,506	2,245	28,517	37,697
Maruti Suzuki India Ltd (Ciaz)	3,099	[illegible]93	22,984	24,060	1,912	[illegible]92	14,035	13,310	1,389	1,[illegible]72	[illegible],[illegible]20	12,184
Nissan Motor India Pvt Ltd (Sunny)	2,327	4,425	25,553	44,3[illegible]8					3,109	3,765	25,383	43,490
SkodaAuto India Pvt Ltd (Rapid)	-	-	3,863	-	-	-	4,[illegible]11	-	-	-	-	-
Toyota Kirloskar Motor Pvt. Ltd (Yaris)			237				295					
Volkswagen India Pvt Ltd (Vento,Virtus)	1,935	2,918	37,[illegible]17	37,[illegible]82	277	[illegible],963	[illegible],758	19,[illegible]95	1,980	[illegible]55	28,[illegible]19	16,313
Total Mid-Size	**16,424**	**14,674**	**1,82,227**	**2,05,362**	**6,093**	**4,365**	**72,578**	**77,424**	**11,742**	**8,605**	**1,03,376**	**1,27,540**
Executive :Seats upto-5, Length Normally between 4500 - 4700 mm, Body Style-Sedan/Estate/Notchback, Engine Displacement Normally upto 2 Litre												
Regular												
Hyundai Motor India Ltd (Elantra)	-	-	[illegible]78	-	-	-	[illegible]72	-	-	-	-	-
SkodaAuto India Pvt Ltd (Octavia,Slavia)	1,846	1,707	3,829	24,[illegible]16	2,030	[illegible],356	3,597	22,085	-	-	-	-
Total Executive	**1,846**	**1,707**	**3,807**	**24,616**	**2,030**	**1,356**	**3,775**	**22,085**	-	-	-	-
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,Superb -3S)	109	[illegible]0	[illegible],351	[illegible],649	99	90	[illegible],460	1,435	-	-	-	-
Specialty												
Toyota Kirloskar Motor Pvt. Ltd (Camry)	135	[illegible]6	958	874	161	[illegible]57	[illegible]71	891	-	-	-	-
Total Premium	**241**	**146**	**2,019**	**2,523**	**260**	**157**	**2,171**	**2,326**	-	-	-	-
Total Passenger Cars	1,70,428	1,89,826	18,37,384	19,72,794	1,33,672	1,42,201	12,90,030	15,78,963	33,515	26,207	3,34,450	3,72,498

* Only cumulative data is available for the Co. NA=Not Available

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

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