



Steelie Awards  
WINNERS 2022

## Introduction

The Steelie Awards recognise World Steel Association (worldsteel) member companies for their contribution to the steel industry over a one-year period. The selection process for nominations varies between awards. In most cases, nominations are requested through the appropriate membership committee and the worldsteel extranet. Entries are then judged by selected expert panels using agreed performance criteria. The winners of the 2022 Steelie Awards were announced on Monday, 17 October 2022.



## Nominations overview

### Excellence in low-carbon steel production

**Ansteel Group Corporation Limited** Low CO<sub>2</sub> emission blast furnace charge solution based on low basicity high silicon pellets and its application

**Ansteel Group Corporation Limited** The R&D of digitisation and networking energy management system at the Bayuquan site

**ArcelorMittal** CO<sub>2</sub> reduction by means of coke oven gas co-injection in blast furnace

**JSW Steel Limited** Project SEED (Sustainable Energy Environment and Decarbonisation)

**Tenaris** Smart furnace for scrap use optimisation based on mathematical models and data science

**Ternium** Carbon capture and utilisation (CCU) in Ternium Mexico

### Innovation of the year

**Big River Steel, a U. S. Steel Company** Development of a single phase (SP) nano-precipitation strengthened batch-annealed SP590 sheet steel with outstanding formability: a low-cost, greener DP590 alternative?

**HYUNDAI Steel Company** Development of materials for electric vehicle reducer

**HYUNDAI Steel Company** Development of 1.5 GPa hot stamping steel in conjunction with high toughness performance

**JFE Steel Corporation** Novel arc welding process for heavy-thickness steel plates with ultra-narrow groove weld joints

**POSCO** STS high-speed extended width AC electrolytic pickling technology

### Excellence in sustainability

**Bangladesh Steel Re-Rolling Mills Limited** An innovative project for utilising 100% induction furnace slag to replace unsustainable fired clay bricks and stone chips in Bangladesh.

**Gerdau S.A.** BIOCOKE

**JFE Steel Corporation** Refractories for hot metal transport vessels contributing to a sustainable society

**JSW Steel Limited** Recycling of plastics in electric arc furnace - leveraging innovative techniques to tackle global sustainability issues

**POSCO** Recycling shell waste for sustainable steelmaking

## Nominations overview

### Excellence in Life Cycle Assessment

**ArcelorMittal** Carbon footprint of cold stamping and hot stamping components

**HBIS Group Co., Ltd.** Using LCA to promote the carbon emission reduction in the whole value chain of hydrogen-based DRI projects

**JSW Steel Limited** Developing and implementing an Environment Product Declaration (EPD) programme and promoting it in market communications

**Tata Steel** PACI – a tool to support innovation and customer engagement through life cycle thinking in the steel value chain

**Tata Steel** Using LCA to identify environmental hotspots to drive decarbonisation

**Nippon Steel Corporation** EPD development for steel products

### Excellence in education and training

**Emirates Steel Arkan** Career Aspirations Programme

**HBIS Group Co., Ltd.** High Skilled Talents Training Centre

**JSW Steel Limited** TalenTech

**Tata Steel** Capability Building for Agile Transformation (UDAAN)

**Ternium** High Skilled Talents Training Centre

### Excellence in communications programmes

**Gerdau S.A.** How the century-old Gerdau transformed its image and became the steel company with the highest global engagement

**HYUNDAI Steel Company** Children's Vocational Experience Center

**JSW Steel Limited** 'Always Around' campaign

**POSCO** Programme designed to bring the steel industry closer to the social media-savvy MZ generation

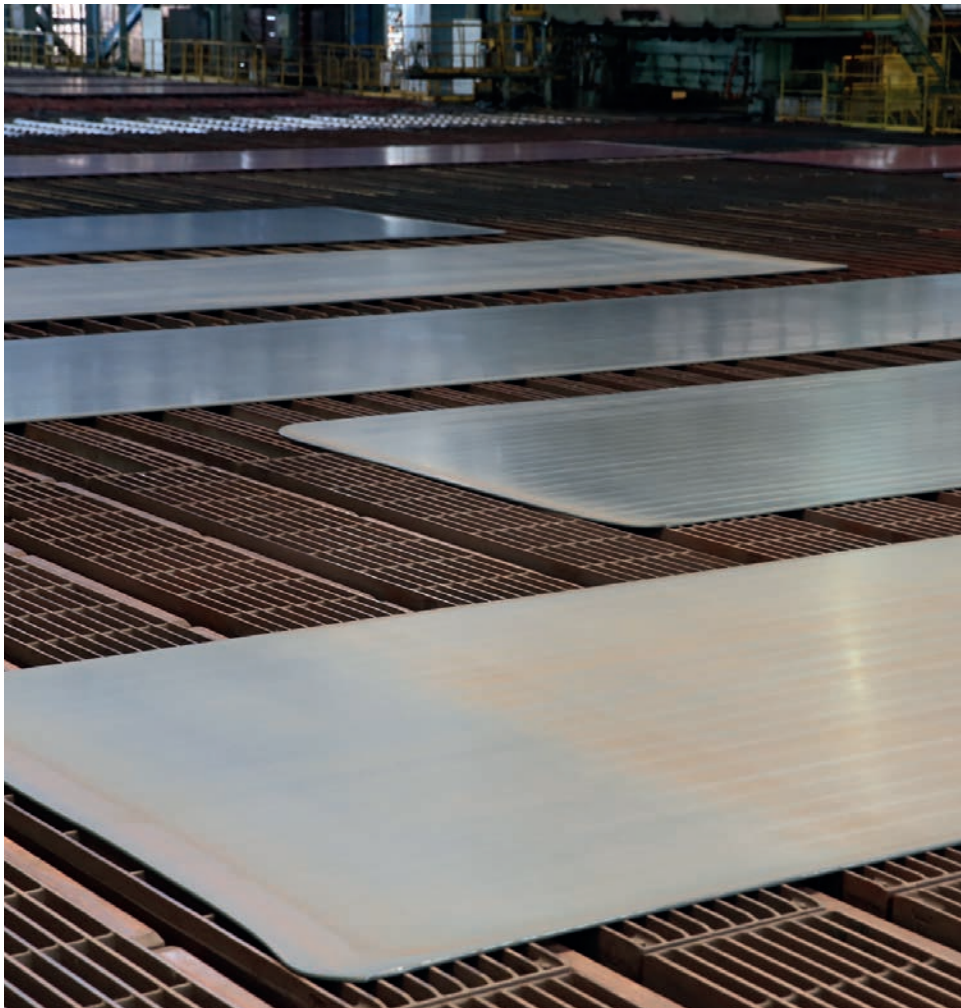
**Tata Steel** Communication on diversity and inclusion

**Tenaris** New way of working and new offices

**Ternium** Ternium Safety Day

## Excellence in low-carbon steel production

### WINNER: Ansteel Group Corporation Limited



#### Low CO<sub>2</sub> emission blast furnace charge solution based on low basicity high silicon pellets and its application

Angang Steel Company Limited Ironmaking General Factory has four 3,200 m<sup>3</sup> blast furnaces and four 2,580 m<sup>3</sup> blast furnaces with a capacity of 19 million tonnes/year; the agglomerated iron ore for blast furnaces is 20 million tonnes/year of high basicity sintering ore and 8.2 million tonnes/year of regular acid pellet ore.

There are three key problems that restrict the low-carbon and low-CO<sub>2</sub> emission of Ansteel blast furnace charge production process structure: firstly, there are many sintering producing lines, resulting in large SO<sub>x</sub>, NO<sub>x</sub> and CO<sub>2</sub> emissions of sintering flue gas; secondly, the proportion of sintering ore in the furnace is high (76%-78% on average), the proportion of pellet ore into the furnace is low (18%-21% on average), and a small amount of natural lump ore (3%-5% on average), so the structure of the blast furnace charge is not optimal in the long term; thirdly, the SiO<sub>2</sub> content of regular acid pellet ore is as high as 6.37%, with poor thermal metallurgical performance. The above three problems are also common in other domestic iron and steel enterprises, which are also common problems that restrict domestic blast furnaces from achieving low carbon and low CO<sub>2</sub> emission targets.

In response to the above three problems, this project is based on the development of low-basicity, high-SiO<sub>2</sub> pellets, a disruptive change to the current acid pellet ore and blast furnace charge structure of Ansteel, innovative development of high efficient calcium-based binder with low silicon for acid pellet ore, the production of high-SiO<sub>2</sub> 0.35-basicity pellet ore, and the thermal metallurgical properties and soft melting properties have been significantly improved.

The achievement was successfully applied to eight Ansteel blast furnaces. The furnace charge structure of the eight blast furnaces was significantly adjusted to 63.51% for high basicity sinter ore, 6.91% for regular acid pellets, 20.78% for low basicity high silica pellets and 8.80% for natural lump ore, initially achieving a low-carbon and low-CO<sub>2</sub> emission furnace charge structure pattern.

## Excellence in low-carbon steel production

### Ansteel Group Corporation Limited



#### The R&D of digitisation and networking energy management system at the Bayuquan site

By acquiring data such as electricity, water, gas, oxygen and steam etc., in real time and implementing cutting-edge technologies such as remote auto-centralised control systems with high stability, mixed gas intelligence on-line scheduling and distribution and auto variable load control for ASU etc., digital and networking remote operations were fulfilled for 37 workstations in six sections.

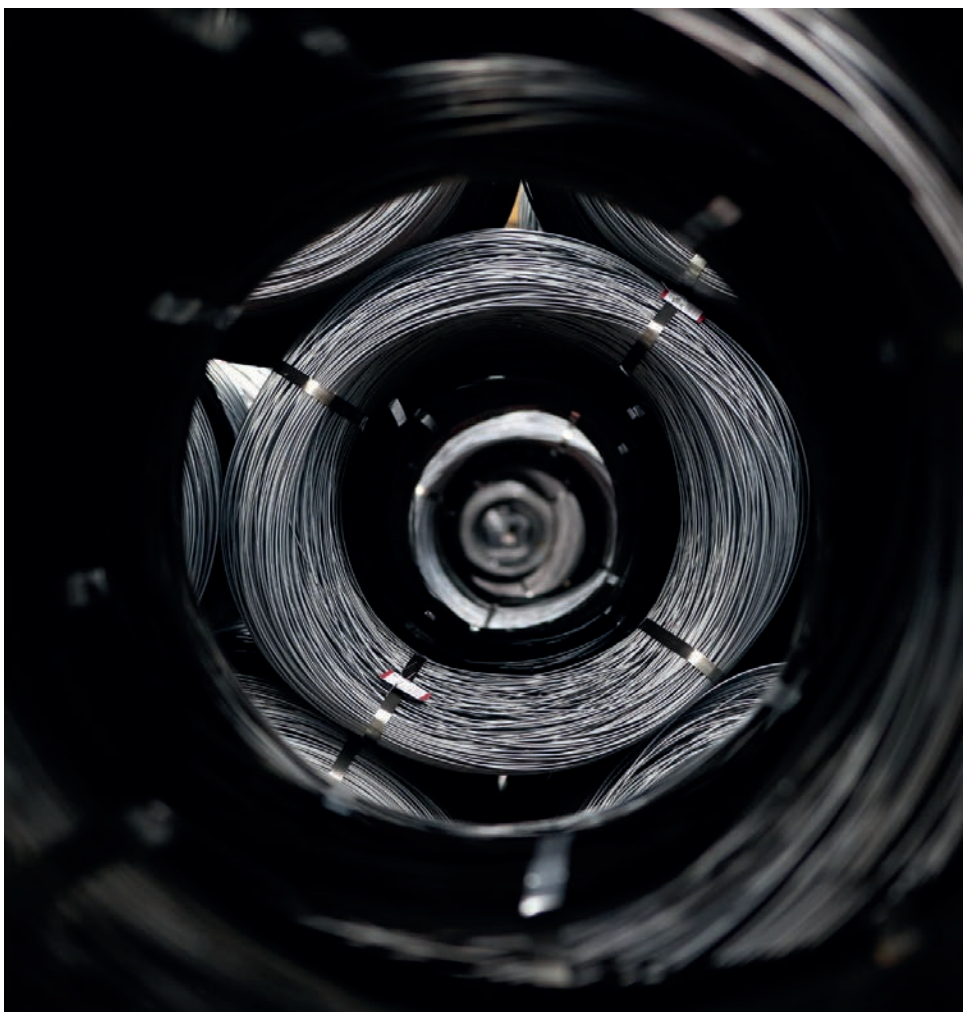
A CO<sub>2</sub> emissions calculating system was developed. The successful use of the project reduces HR by 40%, lowers consumption of gas, water and oxygen etc., and improves the rate of waste energy reuse, produces the economic profit of RMB 167,390,000, and cuts CO<sub>2</sub>, SO<sub>2</sub> and NO<sub>x</sub> by 164,500t, 526t and 458t respectively.

Energy analysis and optimisation models were also built for specific production processes, as well as for the whole site, and were used to analyse and optimise energy consumption.

The development of energy-flow prediction and coupled technology for mass-flow ensures schedule optimisation for gas, steam, electricity and other inputs.

## Excellence in low-carbon steel production

### ArcelorMittal



### CO<sub>2</sub> reduction by means of coke oven gas co-injection in blast furnace

The Gijón (Asturias, Spain) Coke Oven Batteries had been idled in 2013. After a complete revamping, they were put back in operation in 2020 battery 1 and 2021 battery 2. The coke gas is used in the own battery and reheating furnaces of mills, but there was an important excess to be flared. In the past, this excess gas was sold to an external power plant where it was burnt to produce electricity, but the pipe was obsolete and it would be more profitable in terms of energy efficiency and CO<sub>2</sub> reduction to use it inside the factory as a substitute for fossil fuels.

To take advantage of this energy, it was decided to use it as alternative fuel in the BF to reduce coke, coal and, hence, CO<sub>2</sub>. For this purpose, coke gas is cleaned at the Coke Battery Gas Treatment Plant to reduce as naphthalene, ammonia and sulfur as much as possible. After this process, the gas is sent to the factory network where it can be stored in a gasholder, where it is then compressed in a 2-stage screw compressor at 8bar. It is important to keep the gas in a certain temperature range to avoid harmful compounds from transforming and generating clogging or corrosion. The gas flows through a pipe until a distributor, close to the BF, which divides the flow into 29 smaller pipes to bring the gas to the 29 tuyeres. To control the flow, two parallel valves modify it according to BF pressure behaviour or other pressure losses along the circuit. The gas is injected through a dedicated lance at the same time that coal is injected in a second lance in the same tuyere, acting as fuel and reducing agent. After combustion simulations were done in R&D, it was concluded that there is not a harmful effect on coal combustion due to the competition for the oxygen.

Each kilogram of coke gas substitutes around 0.65kg of coke or 0.78kg of coal, as well as a small reduction of coke due to process stabilisation.

The calorific power and H<sub>2</sub> content of the gas leads to an important reduction of coal and coke (Scope 1 CO<sub>2</sub> reduction), not only by the direct reduction but also by a stabilisation of the process created by the presence of hydrogen being used to remove oxide from the iron.

As a secondary effect, the waste gas of the BF (BFG), is richer in H<sub>2</sub> and its calorific power and total energy is higher. This extra energy is used to substitute natural gas (Scope 1 CO<sub>2</sub> reduction) and electrical energy production (Scope 2 CO<sub>2</sub> reduction).

## Excellence in low-carbon steel production

### JSW Steel Limited



### Project SEED (Sustainable Energy Environment and Decarbonisation)

In JSW's attempt to strive for climate excellence, it has launched phase 1 of its decarbonisation programme at Vijayanagar, aiming to achieve best in class emissions globally within the BF-BOF route.

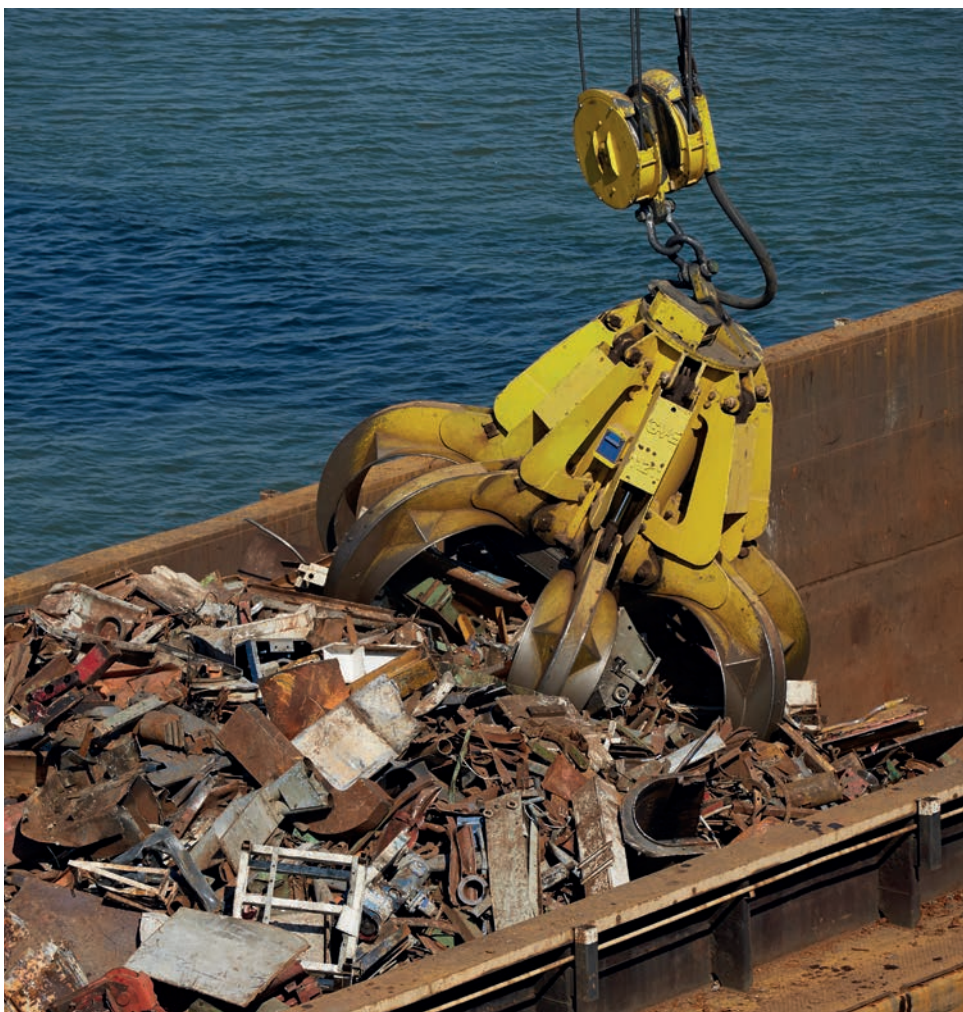
As part of the programme, JSW is building granular shop-specific climate action plans with clear emission baselines, targets and charters for prioritised initiatives.

JSW has set itself the goal of consuming 1GW of renewable energy in the manufacturing of steel.

As a key step towards achieving this, JSW has commissioned a 225 MW solar facility at Vijayanagar that has been operational since April 2022. This makes Vijayanagar the first steel plant in India to deploy renewable energy on a large scale. The project was executed in record time, less than 12 months, despite several headwinds like COVID-19, elevated commodity prices and supply chain disruption.

## Excellence in low-carbon steel production

### Tenaris



#### Smart furnace for scrap use optimisation based on mathematical models and data science

In February 2021, Tenaris set a medium-term target to reduce the carbon emissions intensity of its operations by 30% by the year 2030, compared to a 2018 baseline, considering Scopes 1,2 and 3 emissions. Tenaris aims to achieve this target by using a higher proportion of recycled steel scrap in the metallic mix and by making investments to increase energy efficiency and the use of renewable energy while also looking to implement the use of hydrogen and carbon capture storage and use. This medium-term target forms part of a broader objective of decarbonising operations and reaching carbon neutrality.

Over the past year, Tenaris has made good progress towards its mid-term objective, reducing 14% of CO<sub>2</sub> emissions vs baseline by focusing on energy efficiency and reducing the proportion of pig iron charged into the electric furnaces. This was mainly implemented in its largest steel and pipe-producing mill based in Veracruz, Mexico, TenarisTamsa, where a reduction of 20% in CO<sub>2</sub> emissions during 2021 vs 2018 base year was achieved.

The company's EAF web-based model is fed with thermodynamic data (i.e. enthalpy of reactions, specific heat of steel and fluxes, etc.) and other operational parameters of each furnace (size, arc voltage, etc.) to calculate the metallic yield, electrical energy and oxygen demand, electrode consumption, and expected CO<sub>2</sub> emissions. This model is integrated with a data-driven simulation tool called the scrap recipe optimisation simulator, which based on statistical information collected from previous heats, identifies the best combination of scrap types to achieve a low content of residual elements (Cu, Ni, Sn, Sb) in the final product, while minimising the cost of the metallic charge. These aspects are of paramount importance for the local conditions of TenarisTamsa, as clean scrap with low levels of residual elements (like Cu) is scarce.

As a result of the implementation of these predictive tools, TenarisTamsa reduced pig iron charged during 2020 and 2021 by 50%, resulting in a 20% reduction of CO<sub>2</sub> emissions in the steel process, and with only a 3% increase in electricity and a minimal impact on process yield without compromising steel quality and process costs. The model includes the cost of all raw materials and consumables, together with the internal price defined by Tenaris for CO<sub>2</sub> emissions (80 USD/tonne), allowing then to internalise the cost of associated emissions on the production of steel.

## Excellence in low-carbon steel production

### Ternium



### Carbon capture and utilisation (CCU) in Ternium Mexico

The CO<sub>2</sub> absorption systems installed in the DRI plants in San Nicolás de los Garza, Nuevo León (the Guerrero plant) and the Puebla plant are used to eliminate or remove most of the CO<sub>2</sub> contained in the exhaust reducing gas at the reactor outlet (recycled gas). The CO<sub>2</sub> contained in the exhaust gas is removed in the absorber tower and at its outlet, the high CO<sub>2</sub> content solution is heated and regenerated in the regeneration tower, where it releases the CO<sub>2</sub> absorbed by the solution. This captured CO<sub>2</sub> is sent to a third-party company, which processes it for sale.

The CO<sub>2</sub> that for Ternium is a co-product of the process and that is released into the environment is purified by partner companies to give it a food grade and then use it in carbonated beverages, among other things. In this way Ternium creates a sustainable circle in which it takes care of the environment by preventing the release of CO<sub>2</sub> into the atmosphere and, at the same time, Ternium's partners avoid importing this product, helping to reduce emissions in the country.

## Innovation of the year

### WINNER: POSCO



### STS high-speed extended width AC electrolytic pickling technology

In AC electrolytic pickling, scale removal and dissolution of the chromium-depleted layer can be improved by more than 1.4 times (vs. DC electrolytic pickling) by suppressing the formation of the passivation film achieved through continuous AC polarity change and by accelerating the dissolution reaction in the sulfuric acid tank. It is important to note that this AC electrolytic pickling technology is applied to 4 feet of coil width, which is the world's widest width to which this process is administered. Hence, the world's first high-speed extended width AC electrolytic pickling technology was commercialised with notable benefits observed in productivity, quality, cost and environmental impact.

Firstly, on-site commercial application of AC electrolytic pickling enhances pickling performance, removing the need for additional defect elimination processes and facilities. Moreover, because the pickling process is often identified as a major bottleneck in the hot annealing and pickling (HAP) line stages, the observed benefits translate directly into increased production volume and reduced cost. Because ancillary manufacturing process facilities, such as coil grinding line, can be omitted, lead time is shortened, cost reduced (50%) and productivity enhanced (13.1% at a minimum).

Secondly, surface gloss and roughness are far superior to chemical pickling output. Enhanced pickling performance and the simplification of mechanical pickling methods have significantly improved product quality, giving rise to new high-grade STS products.

Thirdly, although simple in concept, AC electrolytic pickling technology offers a powerful solution to cut (by 26%) the consumption of nitric acid, which generates NOx. Because NOx is a source of environmental degradation, any abatement of nitric acid in the manufacturing process has a positive impact on the environment.

Finally, the application of this promising technology can be expanded even to the carbon steel industry, yielding instant benefits to both steelmakers and their clients.

## Innovation of the year

### Big River Steel, a U. S. Steel Company



Development of a single phase (SP) nano-precipitation strengthened batch-annealed SP590 sheet steel with outstanding formability: a low-cost, greener DP590 alternative?

Taking advantage of the unique line up of CSP (flexible in width and thickness) technology, a novel high strength high formable sheet steel has been developed with very low-carbon lean alloying using an innovative fine grained single phase ferritic microstructure development strengthened with TiC nano precipitates. The sheet steel is produced using a lean C-Mn-Ti alloy design using scrap in EAF and continuously cast and hot rolled followed by cold rolling and batch annealing at lowest temperature (600-650°C) to optimise full recrystallisation of ferrite grains and retaining nano precipitates of TiC developed during hot rolling. A Fully ferritic matrix thus develops strength from fine ferrite grains and nano precipitation and offers highest formability attributes as measured by hole expansion ratio (80-110%) and forming limit strains.

Tensile strengths similar to dual-phase 590 steel is achieved with formability properties far exceed that of DP590 steels or any steels with similar strength. The sheet steel also offers superior yield strengths much higher to that of conventional DP 590 steel, providing potential for automotive applications requiring high yield, high formability. A hole expansion ratio of 90% and above has been registered for sheet thickness of 1.2mm.

The steel has been commercially produced and has been successfully used in critical autobody structural components such as seat side support, auto tubular applications and exhibited outstanding performance in complex stamping applications.

## Innovation of the year

### HYUNDAI Steel Company



### Development of materials for electric vehicle reducer

As the noise generation of the electric vehicle reducer parts is lower than that of the existing internal combustion engine, it is necessary to improve the quietness, so high dimensional precision is required after heat treatment. In addition, as the RPM of a motor increases by 2.7 times compared to the engine (600 million cycles of internal combustion engine transmission / 1.6 billion cycles of electric vehicle reducer (based on a guaranteed distance of 300,000 km), and oil temperature rises, it is essential to develop materials that ensure durability and high-temperature stability.

The development of the materials for the reducer and transmission gear parts has been carried out in a way that increases the hardenability after the carburising heat treatment. However, even though the durability can be secured due to the improvement of the hardenability, it can reduce quietness because the heat deformation increases after the carburising heat treatment. Therefore, HYUNDAI Steel Company's goal was to develop a steel grade that satisfies the conflicting properties, which is reducing thermal deformation while improving durability.

The content of Cr (chromium) and Mo (molybdenum), which are hardening elements, was reduced to decrease the carburising thermal deformation. Instead, the content of precipitated V (vanadium) element, and Si (silicon), a high-temperature softening resistance element, was increased to improve durability.

As a result of the mechanical property evaluation of the material development, the carburising thermal deformation was reduced by 48% compared to the original steel, and the contact fatigue life was improved by 105% in the gear simulation test due to the increase in the precipitate by 15% and the high temperature softening resistance by 82%.

As a result of this development, Hyundai Motor/Kia Materials Specification Registration and domestic patent application (KR1020210133564) have been completed, and overseas patent applications are in progress. The company acquired NET (New Excellent Technology) by the Ministry of Trade, Industry and Energy.

## Innovation of the year

### HYUNDAI Steel Company



#### Development of 1.5 GPa hot stamping steel in conjunction with high toughness performance

Recently, the ratio of applying high-strength steel over 1GPa has been increased to reduce the weight of the car body and to respond to fuel efficiency regulations. In addition, it is absolutely necessary to maintain the stability of high-strength parts of the vehicle body to meet the strengthened crash requirement.

High-strength parts with hot stamping technology may experience brittleness due to bending and welding during a crash. To overcome this issue, HYUNDAI Steel Company has developed a high-toughness 1.5 GPa hot stamping steel sheet that has fracture resistance, a world first. In order to obtain the high-toughness hot stamping characteristics, many technologies such as the homogenisation of the microstructure of the steel sheet, material cleanliness control and austenitic grain size refinement were developed, and these technologies were commercialised through micro-alloy design and manufacturing processes.

Various evaluations have been conducted since 2021 to confirm the performance of high-toughness hot stamping 1.5GPa grade of car body parts, and the material toughness (VDA238-100 evaluation) was greatly improved by about 25%. It was confirmed that the spot welding strength increased by about 67%. In addition, hydrogen embrittlement resistance was improved by about 36%. Based on these characteristics, it was confirmed that the displacement value was reduced by about 23% from the existing 142mm to 108mm in the free-drop tower test experiment.

To apply the high-toughness hot stamping 1.5GPa steel sheet, the company has been conducting advanced research with automobile customers since April 2022.

Hot stamping steel sheets having such high toughness may not only break an old belief that it can be easily broken in the event of a crash but also overcome the limitations of the material performance. It will show excellent performance for battery protection of eco-friendly cars and secure passenger safety. Furthermore, it is expected that HYUNDAI Steel Company will be able to develop customised materials and expand applied engineering through diversifying its hot stamping steel sheet portfolio.

## Innovation of the year

### JFE Steel Corporation



#### Novel arc welding process for heavy-thickness steel plates with ultra-narrow groove weld joints

Arc welding is a necessary and indispensable technology for manufacturing steel structures in the construction, steel frame, construction machinery and shipbuilding fields, but there is a chronic shortage of welding engineers engaged in welding work throughout Japan. In the past, it had been proposed that shortening of welding time can be realised by “ultra-narrow groove welding,” which can substantially reduce the amount of welding.

However, because it is extremely difficult to perform sound welding in ultra-narrow groove welding due to the generation of spatter (scattered molten metal) and lack of penetration, it was not possible to solve these problems with the existing technology.

JFE Steel developed a high efficiency ultra-narrow groove welding system that can solve the above-mentioned problems, thereby realising a large reduction in welding time.

The world’s first optimum CO<sub>2</sub> gas shielded arc welding method in ultra-narrow groove welding with both ultra-low spatter welding and strong and stable arc directivity with deep penetration was developed by adding an appropriate amount of REM (rare earth metal) to the welding wire and setting the polarity to “wire negative,” which is the opposite of the conventional technology.

A novel ultra-narrow groove welding system, which combines a slightly bent contact tip (the part which supplies electricity to the wire) and a welding torch capable of 180° reversal was also developed. Utilising the strong directivity of the arc, a deep penetration depth was secured by promoting melting in the weld and optimising the deposition method. As a result, this technology achieved ultra-narrow groove welding with absolutely no lack of penetration, which had been the greatest challenge.

By realising ultra-narrow groove welding, the amount of welding was greatly reduced to 1/3 of the conventional level. In addition, a further shortening of work time has also become possible by omission of spatter removal work by ultra-low spatter welding and omission of post-welding straightening work by reduction of welding heat distortion. As a result of the high evaluation of the merits of the developed technology, it has been applied in the construction of an office building in the Tokyo Metropolitan area, jackets at Haneda International Airport, and welding of tunnel segments and a large-scale oil tanker. It has also contributed to the early restoration of Kumamoto Castle, which was severely damaged in a series of giant earthquakes in 2016.

## Excellence in sustainability

### WINNER: POSCO



### Recycling shell waste for sustainable steelmaking

South Korea produces an average of 500,000 tons of shellfish annually, and oysters account for approximately 70%. Oysters are intensively cultured in most coastal areas of Korea. The annual output of oyster shells is approximately 300,000 tons in volume, but only 60-70% is recycled.

Considering the substantial production of shell waste along the south coast, shell waste needs better management. Occurrences of marine pollution, diseases, and odours are particularly concerning in the case of unauthorised dumping into the ocean and open forests.

Given there are multiple side effects of disposing of shell waste from the perspective of environmental, hygienic, social, and financial implications, POSCO set out actively to look for ways to recycle shell waste. After determining that shells are similar in composition to the limestone used for sintering, POSCO studied different ways to substitute shell waste for limestone.

By replacing 1 tonne of limestone with shell waste, up to 460kg of CO<sub>2</sub> can be avoided. Moreover, shell waste recycling can cut standardised disposal costs and help address many of the environmental problems caused by indiscriminate dumping. POSCO started utilising shell waste in 2021 and continues to promote resource circulation to achieve environmental, economic, and social sustainability.

## Excellence in sustainability

### Bangladesh Steel Re-Rolling Mills Limited

An innovative project for utilising 100% induction furnace slag to replace unsustainable fired clay bricks and stone chips in Bangladesh



Bangladesh produces 7.5 million tonnes tonnes of steel per annum, mainly via induction furnaces. The processing and utilisation of blast furnace slag was not practiced due to lack of awareness about the properties and characteristics of induction furnace slag.

BSRM is manufacturing steel from the induction furnace route so the slag generated is processed and utilised mainly in construction. BSRM pioneered the usage of induction furnace slag in Bangladesh to replace crushed bricks.

The primary objective of slag processing is to recover metal from the slag. The secondary objective is to avoid slag dumping in landfills, river banks or sea shores. A further objective is to develop a slag aggregate equivalent or better than fired clay brick chips that are abundantly used as base course in road construction.

## Excellence in sustainability

### Gerdau S.A.



### BIOCOKE

As a short-term decarbonisation initiative within coke-integrated mills, Gerdau Ouro Branco developed BIOCOKE, inserting up to 2% of biomass to replace coal in the coke plant, with a reduction of 32kgCO<sub>2</sub>e/t of steel or 10,000 tCO<sub>2</sub>e/month, gains of about 3US\$/t coke.

Among the first initiatives and actions prioritised in the Marginal Abatement Cost Curve (MACC) of Gerdau Ouro Branco, in terms of GHG reduction capacity and which investments will be more cost-effective, BIOCOKE was prioritised for an immediate start, as it is not a project that needs significant CAPEX investments.

As Brazil is the world's largest producer of charcoal, implementation of BIOCOKE was started using biomass from charcoal fines, and, at phase 2, Gerdau will advance in the use of agricultural residues, such as corn residues, coffee husks, and sugarcane bagasse, exploring the great potential of generating this type of biomass in Brazil.

Therefore, BIOCOKE is an initiative that, at the first phase, requires OPEX financial investments, and that can be replicated for all coke-integrated mills in the world, as an immediate contribution to the decarbonisation roadmap of the steel industry.

## Excellence in sustainability

### JFE Steel Corporation



#### Refractories for hot metal transport vessels contributing to a sustainable society

Because hot metal transport vessels have a large surface area and the transport time in these vessels is long, being around 6 hours if the pretreatment process is also included, the heat loss from the surface of the outer steel shell is the largest among all the vessels used in the steelmaking process. Therefore, JFE attempted to reduce the vessel surface temperature by using high-performance heat insulating material, thereby suppressing radiant heat transmission. In this process, the upper limit temperature for use of the insulator and demonstrating the required performance over the long term became issues. These problems were solved by optimising the installation position of the insulator based on thermal transfer calculations, small-scale experiments, etc. The durability and effect of the insulating material were also verified by a commercial plant test conducted over an extended period of time, which showed that the heat loss from the vessel surface could be reduced to 55 to 75% of the conventional level.

There were no effective recycling applications for the refractories used in the hot metal ladle. As reasons for this, in addition to the fact that multiple types of raw materials are used in various special-purpose refractories, the refractories are also contaminated by other materials and impurities such as slag. JFE solved the problem of multiple raw materials by adopting a policy of using the same type of brick raw materials. For contamination by remaining different materials and impurities in recovered refractories, JFE carried out a detailed investigation of the contamination route and the mechanism by which the contaminants affect refractory properties. As a result, the company succeeded in substantially reducing the level of impurity contamination by improvement of the refractory dismantling and management methods and adoption of a simple particle-size sorting method. By further combining these methods and a newly-developed raw material management method, we established a "closed-loop refractory recycling technology" that makes it possible to use stable, low-cost recycled refractory raw materials at a blending ratio of 70%, which is the world's highest level in shaped bricks. With the cooperation of Shinagawa Refractories Co., Ltd., JFE Steel is now conducting long-term stable refractory recycling.

## Excellence in sustainability

### JSW Steel Limited



### Development of construction sand from waste steel slag

Following extensive theoretical studies, laboratory testing and field studies, JSW Steel has developed an innovative process for transforming waste steel slag into IS-3831 compliant sand that is suitable for construction, as well as slag fines which can be used in cement making as well as some agricultural applications. The project culminated in the construction and commissioning, in June 2022, of the world's first steel slag to sand facility (with a capacity of 800 tonnes/day) at JSW's Vijayanagar works.

As a result of the project and the development of the Vijayanagar facility, the following benefits have been realised:

- the recycling of approximately 2.7 lakh tonnes of steel slag waste each year;
- the avoidance of an equivalent tonnage of steel slag waste from entering local landfill;
- net reduction in Vijayanagar works' carbon dioxide emissions by approximately 100 tCO<sub>2</sub>e/annum from the reduced use of vehicles for slag disposal within the plant (this does not include the emissions incurred for river sand excavation and transportation);
- providing an estimated return on investment of just 6 months and an estimated annual revenue of Rs. 16.32 crores;
- creating 9 new jobs within the local community.

In delivering a solution which creates a useful new source of what is an already increasingly scarce commodity, the project has created a reduction in demand for natural river sand in the region of 2-3 lakh tonnes. In doing so, the project has not only made a small but important contribution to the prevention of river and delta degradation and the associated loss of habitats, but it has also reaffirmed JSW Steel's determination to take on the industry's most intractable problems in the knowledge that perseverance and innovative thinking can deliver benefits far beyond those originally anticipated.

## Excellence in Life Cycle Assessment

### WINNER: Tata Steel



PACI – a tool to support innovation and customer engagement through life cycle thinking in the steel value chain

Tata Steel developed a tool - PACI (Product Assessment Carbon Indicator) - to streamline the process of undertaking life cycle studies of products. It can be used to analyse a number of different product and process parameters for the manufacture of final steel products considering the complete value chain, and to understand GHG emission hot spots and trade-offs in the steel product value chain, which can be used to inform new product developments and optimise the existing manufacturing routes.

By using this tool, Tata Steel have carried out a significant number of studies as a result of enquiries from the automotive sector. This has included helping automotive OEMs to review all parts supplied by Tata Steel to identify the 'hot spots' in terms of their carbon footprint. The tool has also been used to support a complete pre-engineering assessment of a concept body-in-white design on behalf of an automotive OEM to examine all aspects of materials selection, including material type (steel versus alternative materials), steel grade, gauge, and aspects of formability and part design. A final example has been to assess the steel grades that Tata Steel produce and improve their understanding of the trade-off between benefits in use from improving motor efficiency versus embodied GHG emissions associated with different grades.

This tool has not only been used to support collaborative projects with customers and facilitate sharing and learning regarding opportunities for emissions reduction over the product life cycle, but also supports marketing through highlighting those attributes of the product, which helps the customer in achieving their own targets and goals for reductions in life cycle GHG emissions. Additionally, the tool has been used to help make the case to regulators, for investment, and to demonstrate the role of steel in delivering a low-carbon society.

## Excellence in Life Cycle Assessment

### ArcelorMittal



### Carbon footprint of cold stamping and hot stamping components

Steel has a long-standing position in the automotive sector due in part to its low carbon footprint compared to alternative materials. Steelmakers have made significant improvements in the last decades to decrease the overall energy consumption and emissions from all life cycle stages. Steel is transformed into a variety of products to serve the automotive industry. On average, flat steel products make up around 60% of a vehicle's body-in-white (BIW) today.

The emergence of hot stamping has led to steel products with very high strength and increased safety properties. Higher strength means that the same function is accomplished with less material, which means that hot stamping grades reduce the material demand for the production of vehicles. The hot stamping steel grades are heated and annealed before the steel blank is actually formed in the press, whereas in the traditional approach, the component is cold formed. However, the carbon footprint performance between the hot stamping and cold stamping is still unknown to the customers.

ArcelorMittal has carried out a study to assess the life cycle carbon footprint of steel components that are produced by hot and cold stamping for the automotive sector. The results show the benefits of hot stamping and its light weighting contributions to the overall environmental performance. The study helped to strengthen the relationship with clients by providing and sharing the life cycle carbon footprint of steel products.

Meanwhile, it also clearly helped the clients to better understand the contribution of steel products in the automotive sector from a life cycle perspective.

## Excellence in Life Cycle Assessment

### HBIS Group Co., Ltd.



#### Using LCA to promote the carbon emission reduction in the whole value chain of hydrogen-based DRI projects

A life cycle approach has been used in HBIS to optimise the DRI (direct reduced iron) process design for preparing high-quality, clean raw materials from hydrogen-rich gas. HBIS chose the automotive industry as the first market to apply their low-carbon steel to, in order to establish the “Carbon Connection” with the automotive industry. They, therefore, built a product matrix of low-carbon automotive steel with carbon emission reduction and cost-plus to help with identifying the value of low-carbon hydrogen-based DRI. At the same time, they developed a carbon footprint platform which can be used by the automotive industry for their carbon emission data management.

According to the study, it is clearly identified that:

- Using 10-20% DRI (hydrogen-rich gas reduced) to produce low-carbon automotive steel through the BF-BOF process is expected to reduce carbon emissions by 8-16%;
- Using 30-50% green hydrogen DRI as a raw material to produce low-carbon automotive steel products through electric arc furnaces (EAF) is expected to reduce carbon emissions by 40-50% compared with the current BF-BOF process, and with the comprehensive replacement of renewable energy power generation, it will reach more than 90% of the carbon reduction potential (Near-Zero Emission);
- It is calculated that the price of low-carbon automotive steel products produced by the new process will increase by 340-900 CNY (about 50-133 US\$).

In general, by using LCA to promote the value realisation of the hydrogen-based DRI process, HBIS has solved the product premium brought by low-carbon transformation, balanced the relationship between economic and low-carbon development, created a win-win situation for steelmakers and the automotive sector while also contributing to China’s “Carbon Neutrality” strategy.

## Excellence in Life Cycle Assessment

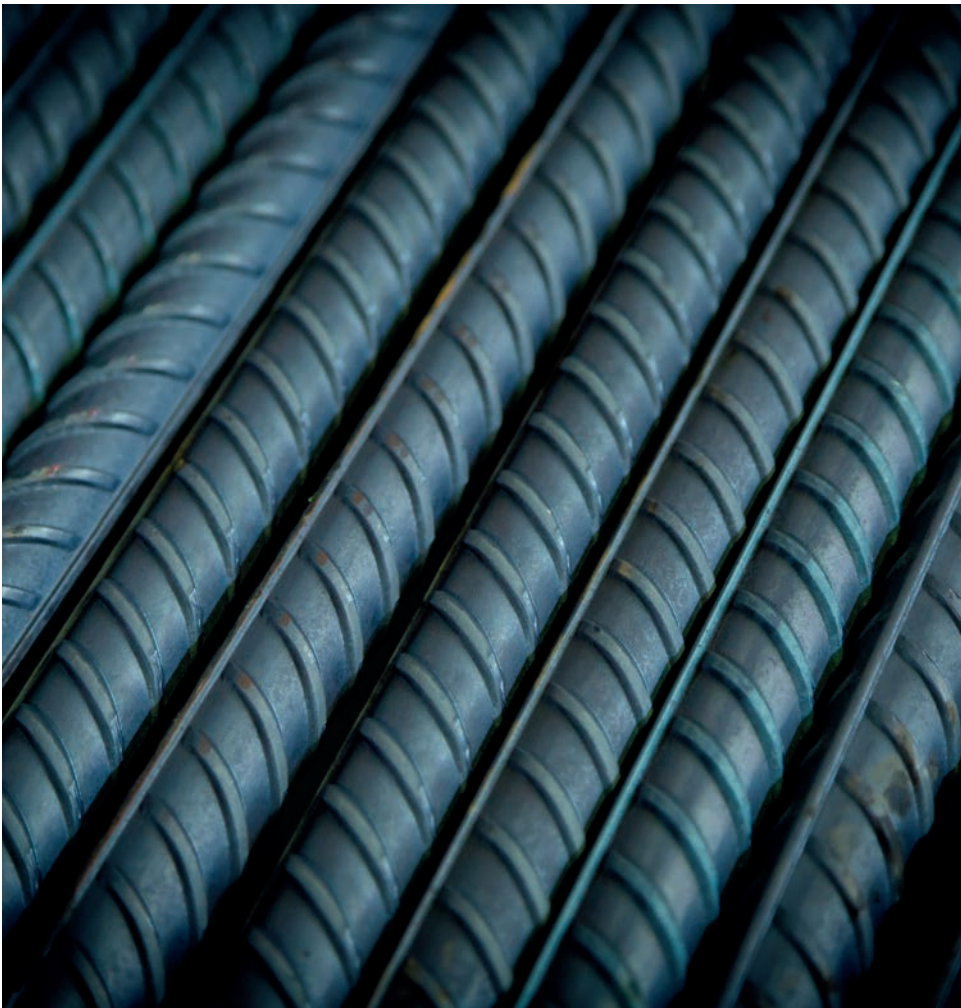
### JSW Steel Limited

#### Developing and implementing an Environment Product Declaration (EPD) programme and promoting it in market communications

As companies commit to net-zero pathways for their own emissions, they are now focusing on reducing the carbon footprint of what they manufacture or build. Developing net-zero carbon assets requires driving down embodied carbon to an absolute minimum.

Considering the potential need to provide to the market clear, credible, and precise information in a transparent manner, JSW developed their environmental product declarations (EPDs), which aim to communicate product-related information to customers and other stakeholders. EPDs provide comprehensive information of environmental properties by describing and quantifying the environmental performance of the products over their complete life cycles.

By embarking on the companywide EPD programme, and completing and publishing their LCA data, JSW Steel has been able to provide accurate and up-to-date information about the environmental impacts of all its products, thus demonstrating its commitment towards sustainability and product stewardship. Developing these EPDs has helped them to identify the performance of their products and the contribution of each process, which is very helpful and useful in terms of hot spot analysis across the value chain and further continual improvement and innovation. With the EPDs, their customers in the construction industry can get points for certification schemes like Leadership in Energy and Environmental Design (LEED) and BREEAM, which can benefit their customers and stakeholders in demonstrating the sustainability of the products.



## Excellence in Life Cycle Assessment

### Nippon Steel Corporation



### EPD development for steel products

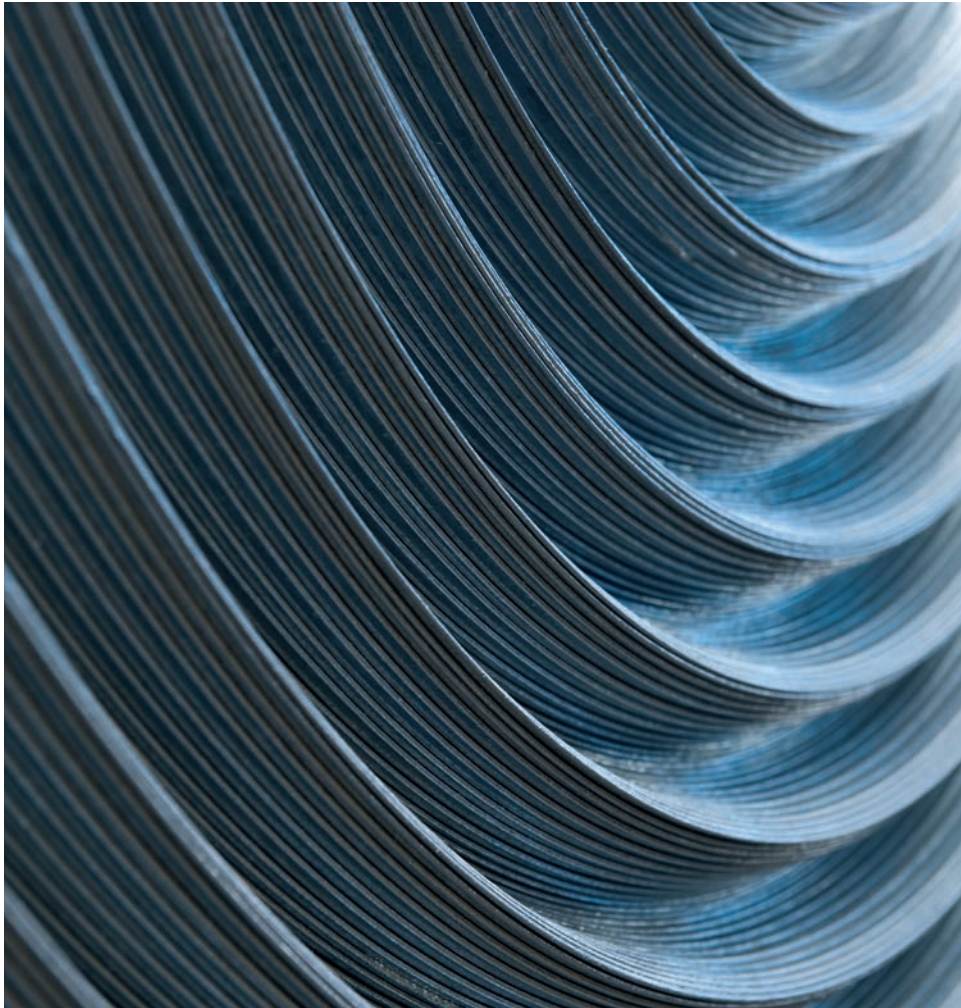
Nippon Steel has developed and published Environmental Product Declarations (EPDs) for most of their products. Environmental Product Declarations, operated as 'EcoLeaf' declaration in Japan, is a proof of the information of the life cycle environmental impact of a product and provides the LCI data of their product to their customers.

The first EPDs of Nippon Steel that were published in 2019 were developed for construction products, followed by tin-plate, OCTGs, wire and bars, plate, and steel sheets in 2022. Now they have developed and published 35 EPDs for their products, covering about 85% of their range. The recycling potential of these products were also published in the EPDs following the ISO 20915 standard. Using the EPDs can help customers to calculate their environmental impacts with the primary data of their steel products rather than using secondary data provided by LCI databases.

In Japan, the 'EcoLeaf' label and QR code are printed on some of the packaging materials (for example Starbucks coffee can, and Bolts & Nuts chocolate) which use Nippon Steel's tin-free steel products. This provides the EPD information for the customers who have used their tin-free steel in their products and is a great way to demonstrate the environmental performance of the products.

## Excellence in Life Cycle Assessment

### Tata Steel



### Using LCA to identify environmental hotspots to drive decarbonisation

Bhushan Steel Ltd (BSL) is Tata Steel's third integrated steel site in India, along with Jamshedpur and Kalinganagar. However, BSL was lacking in having proper systems in place to track and understand the environmental performance of the site and the products that are being manufactured.

Tata Steel has carried out an LCA study for the entire product manufacturing lines of the site to identify the environmental impact of products as well as of the processes of the site, including internal benchmarking with the similar processes at Tata Steel Meramandali (TSM) and in other integrated sites of Tata Steel Limited.

This study helped Tata Steel to identify the environmental performance of their steel products and benchmark the environmental performance compared to similar process within other sites in Tata Steel Limited. It also helped in understanding the hotspots for improvements and was used to showcase the outcome in the CII-ITC's sustainability award under the Product Responsibility category. The LCI data also helped in baselining and quantifying the potential benefit of the projects considering the Internal Carbon price, which helped in computing Carbon Adjusted Internal Rate of Return (CAIRR) for capital allocation. This project and the initiatives based on this project will help Tata Steel achieve their overall goal of <math><2\text{ tCO}\_2\text{/t}</math> crude steel by the financial year 2025.

## Excellence in education and training

### WINNER: Ternium



### Competences Certification Programme for Risky Tasks (CCRT)

In order to improve the control of risks events, Ternium launched the Competencies Certification Program for Risky Tasks (CCRT). This programme had as its main challenge the search of complete alignment with safety standards, in multiple geographies, culturally diverse and in production facilities with different technologies, raising the training level to a higher standard. With a powerful combination of different technologies and methodologies, an innovative training model (Building Blocks model) and with full engagement of all the levels of leadership (from top management to supervisors), this programme will impact almost 10,000 of Ternium's own first-line workers, and will include contractors from 2023.

## Excellence in education and training

### Emirates Steel Arkan



### Career Aspirations Programme

Emirates Steel Arkan (ESA) continuously strives to foster and develop talents across the organisation. The management recognises the importance of coaching, which is a vital/powerful communication tool for organisations and individuals. When we draw on our coaching skills and effectively use these skills with others, we are building the capabilities and confidence of people who will take on the future. The outcome of this learning journey will become part of the organisational DNA. Leaders will develop and refine their coaching skills and foster this learning mindset in others such that coaching skills as well as other leadership skills will be gained.

“The Leaders” programme guided the delegates through the skills required for coaching and how coaching engages and motivates people, enhances team performance, strengthens leadership skills, and increases confidence.

The programme commenced in September 2021 and concluded in January 2022; targeting 250 employees, who are categorised under managers, section heads and supervisor levels. The programme roadmap comprised of 4 workshops/sessions: Induction Session – Workshop 1 – Workshop 2 – Quality Circle.

“The Leaders” was designed to produce a performance feedback and coaching culture across the organisation. Employees will both value and trust the feedback process, embrace career development, and address their personal and career growth. They will feel motivated to ask for feedback as part of their commitment to their own career/personal development. This results in a transparent and reciprocal approach to feedback and coaching across the organisation.

An internationally recognised ICF certification (Continuing Coach Education - CCE) in line with the core competencies of coaching was awarded to the programme delegates.

## Excellence in education and training

### HBIS Group Co., Ltd.



### High Skilled Talents Training Centre

In order to adapt to the accelerated transformation of the economic development situation, accelerate the optimisation and upgrading of industrial institutions, and promote the transformation of the company from the steel industry to the material industry, Chengde Vanadium Titanium has built a high skilled talent training base integrating staff skill training and skill competition based on the staff skill improvement base, combined with the construction of five staff innovation studios and three skill master studios.

Through the talent advantages and equipment advantages of the enterprise, the training mode of combining work and study is adopted to continuously cultivate technical experts who meet the requirements of the national standard for high skilled talents, so as to promote the cultivation of skilled talents in HBIS towards a scientific, standardised and sustainable development path.

## Excellence in education and training

### JSW Steel Limited



### TalenTech

'TalenTech' - JSW Group's flagship centralised Graduate Engineer Campus Programme was introduced with the objective of attracting and onboarding future leaders for businesses. The primary focus of TalenTech was to create a sustainable framework to objectively assess, select and develop students and provide an equal opportunity in the selection process.

TalenTech was run on a Digital AI powered Campus Connect Platform that ensured that the entire engagement cycle for students and campuses was system driven, ran virtually and was completed within 3 months. It had the following stages:

- Stage 1: Identified 300 campuses and reached approx. 2,50,000 students;
- Stage 2: Online cognitive and domain knowledge testing assessment for 16,000 students via a single click of a button;
- Stage 3: Group discussions facilitated by 250 JSW leaders for 7,000 students;
- Stage 4: Final interviews hosted by mid-senior level internal panels for 2,300 students
- Stage 5: Final offer was rolled out to 850+ students who were placed pan-India.

The initiative helped increase JSW's brand awareness across India; build a robust talent pipeline with strong technical competencies; improved the diversity ratio of businesses; induced positive engagement amongst students; ensured business continuity and improved performance through the constant availability of young talent.

The students were on-boarded from across locations through a 3-day virtual orientation session where they were welcomed by JSW Leaders who spoke on the vision, mission and values of the organisation. Their fellow engineers took them through the group overview.

As the next step, students will go through a structured 100 days location specific induction programme.

## Excellence in education and training

### Tata Steel



### Capability Building for Agile Transformation (UDAAN)

Tata Steel aspires to be the most valuable and respected steel company globally and emerge as a “Global Steel Industry benchmark” for value creation and corporate citizenship. To realise this aspiration, the company wanted to transform to a more agile Tata Steel that could make timely, effective changes in response to a dynamic environment and constantly renew itself to create sustainable value for all stakeholders.

Tata Steel launched the Agile Transformation Journey, “UDAAN” in July 2021. A key facet of this transformation was to evolve a future-ready culture underpinned by 4 Agile Behaviours as follows:

- Be Accountable – ownership and accountability;
- Work Together – collaboration;
- Respond Quickly – responsiveness;
- Unleash – people development (for senior leaders); Evolve – team building (for others).

It was imperative to educate and train our officers on the 4 Agile behaviours to enable them to adopt and demonstrate these behaviours consistently. We also needed a way to baseline where we were on the 4 behaviours, and the impact of the capability building intervention in achieving a positive shift on these behaviours. We used 360-degree feedback on behaviours for every officer at the start of the intervention and towards the end of the intervention to measure the effectiveness of the intervention. To drive this journey, our leadership team took charge of practising and role modelling the agile behaviours at their level first, followed by adoption and implementation down the levels in the organisation.

## Excellence in communications programmes

### WINNER: Gerdau S.A.

#### How the century-old Gerdau transformed its image and became the steel company with the highest global engagement

Gerdau, the largest Brazilian steel producer, has always been one of the most traditional companies in the Americas. In 2021, when it turned 120, it faced an image and reputation dilemma, similar to that of the main global steel companies, despite having one of the models with the lowest environmental impact in the world. Another challenge was the association with mining, which already had a reputation as a sector that devastates the environment and which was enhanced by recent tragedies with Brazilian dams. To top it off, this scenario had an impact on attracting new talent.

For this reason, Gerdau turned its 120th anniversary into a starting point for a new cycle of brand positioning and reputation, with intensive communication planning, digital vision and a 360° communication strategy.

#### Goals:

- Communicate the celebration, contextualising the story and repositioning the brand (focus: modernity, innovation, diversity and inclusion);
- Make digital communication platforms a great lever for engagement and image change;
- To be the most admired industry in Brazil;
- Connect the legacy to the future and the purpose of empowering the people who build it;
- Expand connection with audiences.

With a disruptive strategy, changing historical behaviour from a low profile industry in communication to a high profile one, especially in digital communications. The strategy was based on priority audiences and their profiles, with an important investment in performance, content and the reach of communication channels.

Gerdau also started to have digital channels on all the main platforms: Facebook, Twitter, Instagram, YouTube, Spotify and TikTok (first steel company in the world in this network).

Gerdau built a new identity (an innovative concept based on data), which connects history and its projection of the future. It chose the metaphor of a tree (endemic to the region where Gerdau was born), which alludes to a strong origin, with solid roots and which continues to produce prosperous fruits.



## Excellence in communications programmes

### HYUNDAI Steel Company



### Children's Vocational Experience Center

HYUNDAI Steel Company has successfully operated the Hyundai Steel Children's Vocational Experience Center in KidZania (Seoul branch) for three years (July 2019 to July 2022) to promote the sustainability of the company and the steel industry to internal/ external stakeholders.

In the perspective of ESG, the company has set the operating theme of the vocational experience centre as a 'Steel Material Research Center' grounded on the company's earthquake-resistant steel brand H-CORE(1st Operating Period), and subsequently set as an 'Eco-friendly Steel Works' based on the electric arc furnace system. Children who have participated in each theme could naturally become familiar with the sustainability of the company and the steel industry through various programmes, such as earthquake-resistant building model experience, mini car driving test, electric arc furnace simulation control, and audio-visual materials on safe and eco-friendly steel.

In addition to this, during the summer vacation season (Aug 2021), the 'Can Crush Challenge' event (steel recycling) was effectively delivered to children to play and become viral through social networks, and various events will be planned in the 2nd operating period.

Currently, Hyundai Steel Children's Vocational Experience Center has an estimated 22,000 visitors per year for children (about 40,000 including parents) and indirect exposure of the company brand to about 540,000 visitors to KidZania (Jun 2021- Jun 2022, for one year).

According to a visitor survey by Gallup Korea, an external research institute, children showed an increase in positive responses in both brand funnel analysis and image analysis compared to that prior to the visit (especially, the level of perception that the company fulfilling social responsibility was largely increased). In addition, the company estimates that it will benefit from cost savings of 1.66 billion won per year in terms of promotion to potential human resources.

As the COVID-19 situation improves in the future, the number of visitors is expected to increase, and as a result, the effect of communication through job experience centres is also expected to expand further.

## Excellence in communications programmes

### JSW Steel Limited



### 'Always Around' campaign

JSW Steel's new campaign 'Always Around' aims to highlight the central role JSW Steel plays in transforming our everyday lives by showcasing the various applications of the steel brand in an engaging and entertaining format – "Claymation".

Insights for the campaign:

- 1) Steel remains one of the most favourable metals, though the top of mind mentions have dropped in India. There is a dip in scores of "essential metals which is widely used."
- 2) Steel is one of the most versatile metals and finds its application in diverse products that has made human lives more meaningful and progressive. Yet, as consumers, we do not think about steel and often neglect to notice the significant role steel plays in our lives.

The core idea of the campaign was based on the above insights and the creatives were conceptualised to amplify the positive attributes associated with steel – strong & durable, is everywhere in your life.\*

The communication is targeted at the entire value chain. While the decision makers for buying steel products are the primary audience, the campaign was also directed at other stakeholders who are relevant to our business, including partners, bankers and media.

In line with the above communication objective, the media vehicles conceptualised for this campaign included a mix of television, digital (social media, search and video platforms – YouTube, over the top channels (OTT) / online streaming services –e.g. Disney+, General & Business News Channels) and Out of Home.

*\*Ipsos MORI study for worldsteel: Reputation of Steel and Steel Industry – India dated April 2018*

## Excellence in communications programmes

### POSCO

Programme designed to bring the steel industry closer to the social media-savvy MZ generation



Based on a most-preferred employer survey (source: Jobkorea) conducted amongst jobseekers in Korea, POSCO, Korea's leading steelmaker, has consistently dropped out of the top 10 since 2015. Previously, POSCO consistently ranked 1st or 2nd as 'preferred employer'; today, however, tech industries, such as "Kakao" and "Naver," have carved out the top spots in Korea. It does not help that the inherent nature of the steel industry and how it is often depicted in the media conjures up images of the 'old chimney' rather than a futuristic icon. Clearly, job-seekers are increasingly flocking to jobs pertaining to industry 4.0. To address this observation, POSCO has embarked on a new mid- to long-term mission to build engagement with Gen MZ. To do so, POSCO began analysing their demographic characteristics.

Gen MZ prioritises social values and rationale in addition to the business performance of a company; they develop a strong loyalty to brands with which they share common values. Hence, they identify with companies practising good ESG management and are keen to purchase their products. In addition, interactive bi-directional social media is preferred to traditional media (mass media).

Last year, to promote 'low-carbon eco-friendly steel' as the core message of its communication campaign, POSCO adopted "Green Tomorrow with POSCO" as the new corporate slogan. To launch the campaign, POSCO shed its traditional modes of communication, and shifted their priority to the interests and preferences of Gen MZ. In the second half of 2021, their campaign had transitioned to social media-specific promotion. By focusing strategies on generating "fun" and seeking "empathy," two qualities that Gen MZ identify with in social media content, POSCO used YouTube and Instagram to roll out 3 strategies.

The campaigns have helped to bring the concept of 'low-carbon eco-friendly steel' closer to Gen MZ. Using a character narrator to tell the story of the steel industry, POSCO has built a friendlier image of the business.

Finally, the credibility and impact of the messaging has been maximised by communicating through a third-party influencer.

## Excellence in communications programmes

### Tata Steel



### Communication on diversity and inclusion

Our people are our biggest strength and hence, a plethora of initiatives, policies and interventions have been undertaken by the organisation in order to foster a connection between employees and stakeholders, irrespective of their job, function, role or geographical location.

Committed to creating a diverse, inclusive, safe and fair workplace, Tata Steel has taken a target of having 25 percent diverse workforce by 2025. As a certified gold employer under Workplace Equality Index for LGBTQIA+ workforce, the company aims at curating a workplace where people can bring their authentic selves to work. This not only involves the successful deployment of a diverse workforce, but also the involvement of both management and union representatives in these recruitment processes, through JDC D&I Committees, from the grassroots level. Hence, regular communication is done across hierarchies, at both internal and external platforms and in multiple languages, with an objective to create more awareness, foster a sense of belonging and a level playing field for all.

The diversity and inclusion journey has been documented through the in-house journals, newsletters, films, vlogs, blogs, podcasts, webinars, creatives, interviews, authored articles, industry/ feature stories and others, and has been communicated on various platforms, in multiple languages and through all the communication tools available to us.

The organisation is focussed on the judicious implementation of enabling policies and interventions and is conscientious of the same through internal and external communication platforms, so as to better embrace a diverse workforce and establish a unique and immersive organisation culture.

The vision is to make Tata Steel a world-class employer where everyone is respected and every voice is heard.

## Excellence in communications programmes

### Tenaris



### New way of working and new offices

Tenaris faced enormous challenges and opportunities during the pandemic that made it review traditional ways of working, discover new strengths and reemphasise its focus on people. To address this enormous challenge, a global communication campaign was launched to identify and promote new behaviours and skills that were key in the transition to a hybrid working environment where the physical presence in our mills continued to be paramount. For this, nine key behaviours were identified as part of a new way of working, to guide teams and align company goals in a new era of hybrid working schemes (with physical presence and remote activities), new sanitary protocols and renewed health and wellbeing priorities:

1. Enhance priority and agenda management
2. Foster the adoption of new technologies
3. Promote a more collaborative working environment
4. Endorse an innovative and entrepreneurial mindset
5. Strengthen employee accountability in new working scenarios
6. Facilitate and foster the adoption of agile decision-making skills
7. Reinforce a culture that supports constant and frequent feedback
8. Stimulate leadership skills based on active listening and empathy
9. Encourage healthy behaviour aimed at the wellbeing of all team members

The goal of the global communication campaign was to align contents with this company-wide strategy.

Top management, supervisors, and team leaders became ambassadors of this campaign that included videos, editorial series, a microsite, training courses and events, an e-mailing campaign, and a cross-content strategy for the New way of working theme to integrate into the core of the company's activities.

The new way of working materialised in the revamping of Tenaris offices, where working spaces were reconfigured to keep pace with the changes in the new working dynamics. These elements include open-space and lounge areas, integrated nature, hi-tech connections, ergonomic chairs, and integration of offices with production lines (including open windows allowing a direct view on the production area).

## Excellence in communications programmes

### Ternium



### Ternium Safety Day

On July 22, Ternium commemorates the Safety Day (Día de la Seguridad) to work, analyse, and discuss our safety performance and how can we get to our goal of zero accidents. On 2021 we stopped over 20 operative lines and staff leaders – including our CEO – reunited with the personnel to reflect on shared responsibilities and our daily engagement with safety.

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