TATA STEEL
WeAlsoMakeTomorrow

TATA

Brief Introduction of Khondbond Iron Mine

Khondbond Iron & Manganese Mine
M/s Tata Steel Limited
Mine Code - 330253

Safety Pledge

I am committed to safety of myself and my colleagues at all times by following rules and safe habits.

Health & safety is priority, Mining is prosperity

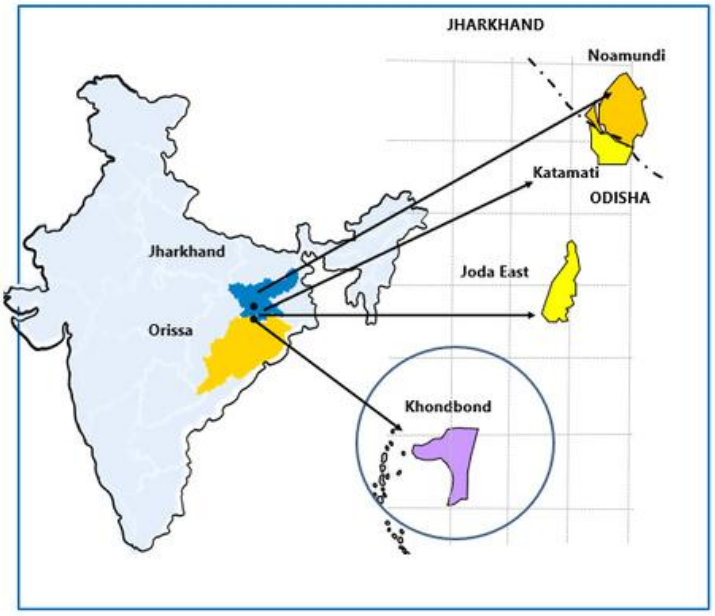
Contents

About the booklet

A comprehensive overview of mine operations, performance, safety efforts, and value creation is provided in our 43rd Annual Mines Safety Fortnight Celebration booklet. It provides a succinct review of operational and general safety prospects highlighting the safe operations of the mine.

Mine Overview

Mine Location & Geology



Khondbond Iron & Mn Mine is an integral part of Tata Steel OMQ division and is located near Joda in the Keonjhar District of Orissa. The area comes within the survey of India toposheet no. 73 G/5 between the longitudes 85° 21' 0" and 85° 24' 17" and latitudes 21° 54' 50" and 21° 57' 47".

The nearest railway station is Juruli (S.E. Railway), Joda which is 7 km away from the mine. The mine is connected by a fair-weather road from Joda at about 10 Km.

This mine is located about 5 km from the Banspani - Palaspanga road and 15 km from NH-520 connecting Joda to Panikoili.

The area has a widely undulating terrain with steep escarpments, moderately elevated plateau, and narrow winding valleys. The extreme north and northwest of the area lie on the southern slopes of Tiring Pahar and the southern portion of the western boundary of the block runs along Satkutnia hill.

The highest elevation is 755.43 mRL. The contour extends from 750 mRL to 558 mRL. A significant ridge is running almost centrally in NNE-SSW direction making the central portion elevated and slope towards east and west.

Khondbond iron deposit belongs to the Iron ore group in the Singhbhum Super Group formed during the Pre-Cambrian era (c. 3100 Ma), of the Dharwarian age as observed from the stratigraphic tables.

The area consists of slightly metamorphosed sedimentary formations viz. Banded Hematite Jasper (BHJ), phyllites, shales with intercalations of lava flows & tuffs.

Salient Features of Mine

Khondbond Iron & Mn Mine is a captive opencast mine with fully mechanized operations. Currently, the mine produces Lump ore and Fines Ore. It supplies lump and fines ore to the company's steel plant at Jamshedpur, Kalinganagar, Meramandali, and other sister concerns.

The manganese operations in the Khondbond mine are semi-mechanized and Mn. ore is supplied to the company's Ferro Alloys plant, Joda.

Fleet used in KIM

SN	Machinery	Make	Model	No. of Units
1	Drill	Atlas Copco	IDM-45	2
2	Drill	Epiroc	ROCL8	1
3	Drill	Epiroc	D65	1
4	Shovel	Tata Hitachi	EX1200-5D	4
5	Dumper	Komatsu	HD785-7	10
6	Track Dozer	Komatsu	D275A-5R	4
7	Water Sprinkler	Komatsu	HD465	2
8	Wheel Loader	Komatsu	WA900-3EO	2
9	Wheel Dozer	Komatsu	WD600-3	1
10	Motor Grader	Komatsu	GD825A	1

5 Years Journey of Dispatch

Parameter	FY' 21	FY' 22	FY' 23	FY' 24	FY' 25	FY'26 (till Oct'25)
Total Despatch (MnT)	4.2	4.9	5.18	5.5	6.9	4.1*

Apart from this, several Mitigation measures have been taken to alleviate operational risks such as digital initiatives to optimize inventory and improve process efficiencies, adopting advance maintenance practices to improve plant and equipment reliability etc.

Statutory Permissions

1. **Reg. 106(2)b of MMR 1961, Perm|2024|264810**
   HEMM & Deep hole drilling and blasting permission.
2. **Reg. 155 & 162 of MMR 1961, Perm|2023|255360**
   Drilling, charging, stemming and firing of shot holes.
3. **Rule 18 & 19 of MVTR 1966, Perm|2023|261232**
   Maintaining Group vocational training center & Arrangements.
4. **Reg. 67(2) of CEAR 2023, Perm|2024|268770**
   Permission for blasting in 300m from 33 KV electrical supply line.

Key Safety Initiatives taken

Haul Road Analysis & Control

In Mining Operations, haul roads are heart of the mining, so this project analyses the haul road condition along with location using camera & GPS respectively. As a result, fuel consumption is reduced in Mining operations.

Remote operation of water filling point

A motorize valve was installed at water filling point, it will be integrated with a controller. The controller will receive the feedback from the remote and operate. The remote is provided to tanker operator for operating from the inside of the cabin.

Radio Remote Control of Smart Drill

To eliminate the Human-Machine interface in the SmartROC drill machine, introduced the Radio Remote Control of Smart Drill system for easy and safe operation of drills at every place of the mine.

Strike Alert to Predict lightening during Charging

The operation of blasting on mining face has many hazards associated with it. The dynamic main hazard is lightening from sky which may result in serious injury to blasting team.
Strike alert device has introduced in which can predict the lightening from the sky and alert the blasting team removed from the blast face.

Online Driver Fatigue Monitoring System

Monitoring & observing of driver activities while driving is necessary in mining to eliminate the accidents and injuries. The signs of sleep, Seat belt absence, yawning and head turns etc. reflects the fatigue of driver or operator.

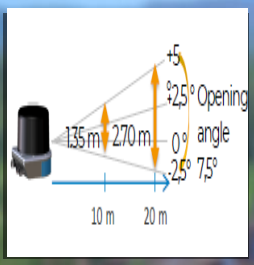
Key Safety Initiatives taken

Installation of Hydraulic Ladder in Dozer

To reduce the risks associated with Slip-Trip-Fall, a power ladder has been added to the current dozers. It makes climbing up or down more convenient for the operators. It contains an automatic system for opening and closing the ladder up or down, which lowers the likelihood of equipment property damage (ladder damage) due to roll-down of boulders.

Installation of Human Anticollision on Stacker

Moving machinery causes the accident at anytime, need to eliminate the hazard leads to reduce the accidents included from moving machinery. Human anticollision on stacker reduces the accident rate at stacker and increase the safety.



Automated Boulder Detection system

The geology of KIM is challenging to handle with boulders control, so introduced Boulder Detection System to encounter the crusher detention hours. The high-quality resolution camera installed on top of shovel cabin can detect the boulders and give alert to FMS & Shift in charges.

Installation of STK (Safety Training Kiosk)

Workmen personnel training to be gain and revised the knowledge acquired in an easy and safe manner and it provides safety passport after training. All training materials are available in three languages: Odia, English, and Hindi.

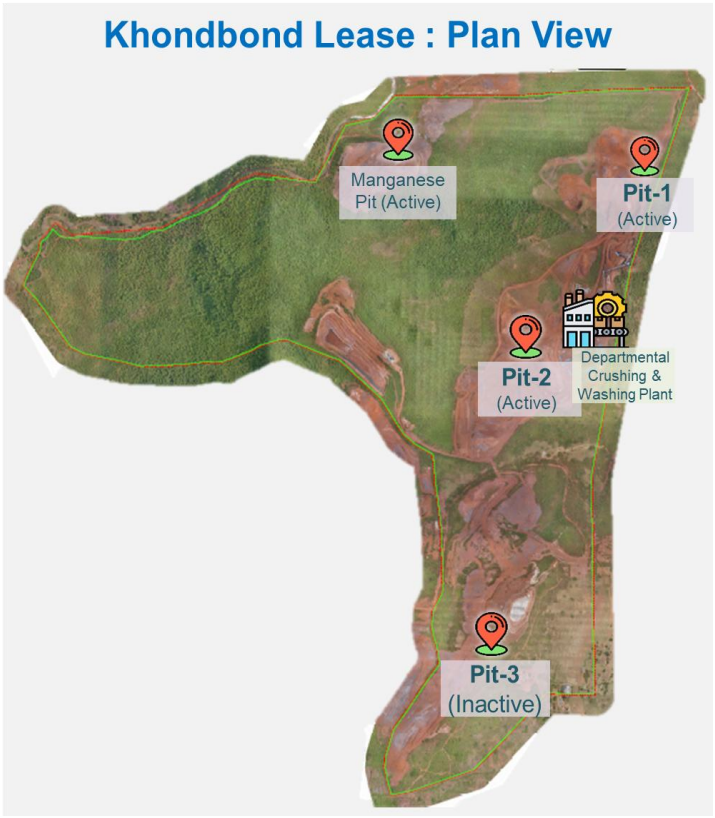
Installation of Smart Barricading in Plant & TLS conveyors

Smart fencing is implemented in wet plant conveyors, take up pulley area and head end. Because of its installation, the conveyor will start only after hard barrication is done and closed if anyone remove barrication. This result in elimination of moving machinery hazard.

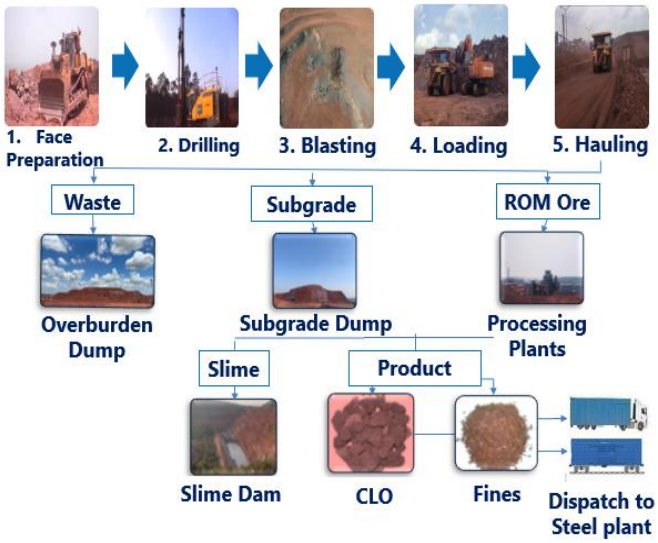
General Working of Mine 01

Here at KIMM, different ore zones are separated by waste patches, as well as ore bodies themselves comprise intercalated subgrades and wastes. Therefore, it has been anticipated that there shall be considerable dilution by way of mechanized mining operations which will further deteriorate the ROM quality. Currently, mineral reject dumps are developed to store mineral rejects.

To make the best use of the deposit, it has been proposed to beneficiate the entire iron ore and convert the final products into iron ore lumps and fines of desired specifications suitable for Blast Furnace.

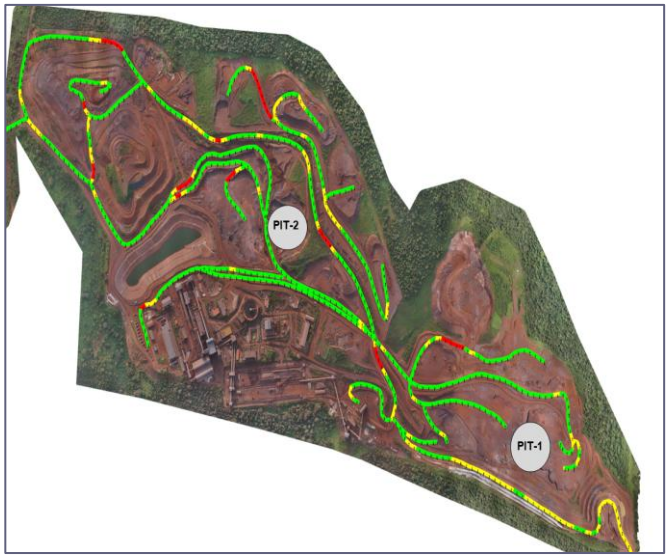


Mine Layout



Process Flow Chart

Separate lane for HMV and LMV haul roads



Overall Haul road network in the Mines – 11km

Haul Road & Traffic Rule 02

Haul Roads are maintained on a regular basis with the help of necessary resources. Good Haul road maintenance results in effective productivity and safety enhancement.

The installation of warning and instructional signs is effective in promoting safety on surface mine haulage roads. In the surface mining environment, these safety devices are viewed as reminders rather than as first warning measures.

Compactor

Grader

The Code of traffic rules is diligently followed by each and every vehicle plying inside mine premises.

A special effort has been made at KIMM to eliminate communication at junctions, **Automatic Traffic Signal at Junctions** and improving safety

Retroreflective sensors and a Programmable Logic Controller (PLC) were installed at the HEMM-LMV junction to detect approaching HEMM within 100 meters.

Virtual barricading system

Automatic Traffic Signal at Junctions

HEMM Operation & Maintenance 04

At Khondbond Iron Mine, ore bodies are developed by a series of benches of 10 meters in height. Four shovels of 5.9 Cu.M capacities and two-wheel loaders of 9 Cu.M. along with 10 dumpers of 100 tonnes capacities are being deployed.

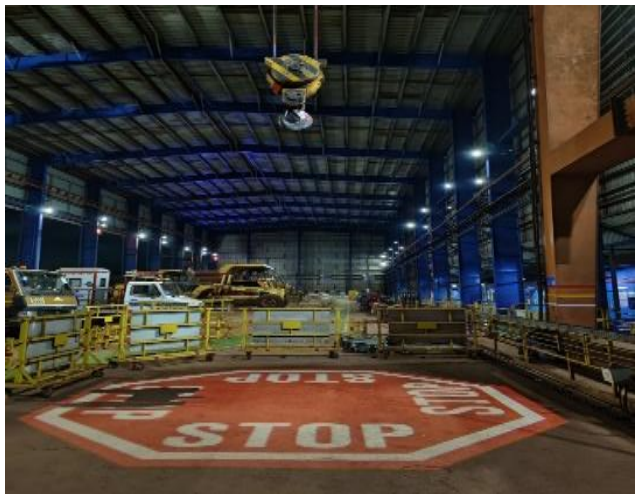
Drilling is done by 165 mm diameter drills and blasting is done using conventional slurry and SME explosives.

The blasted ore is handled by a Shovel-Dumper combination and transported to either ore stockpiles or directly fed to the existing processing plant and new crushing & washing plant.

For mine development and maintenance, several auxiliary equipment's such as wheel/ track chain dozer, motor grader, rock breaker, backhoe, JCB loader etc. are utilized.

HEMM operations

Safety initiatives and best practices



Laser beam projector in Gantry crane

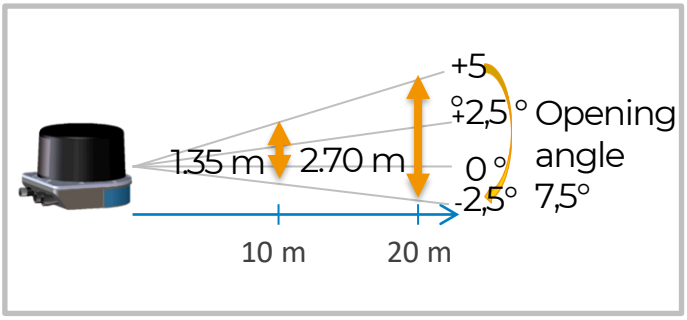
Plant Maintenance 05

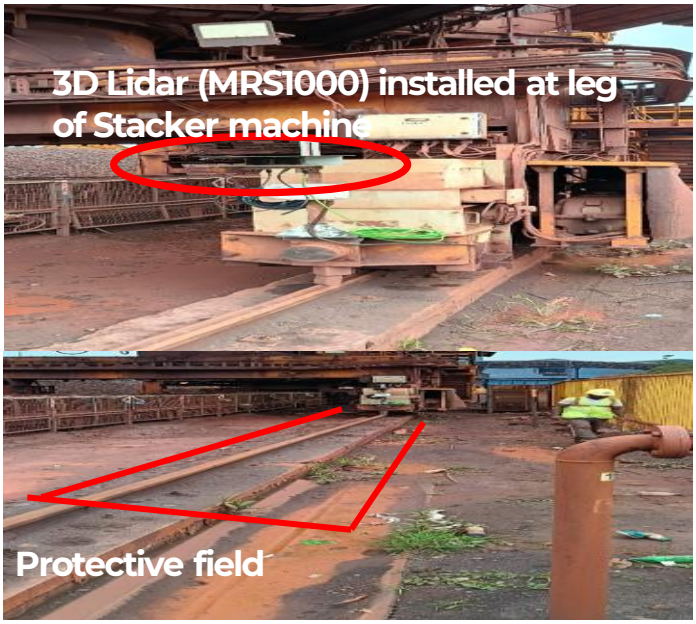
Departmental Crushing & Washing Plant

The Wet Processing Plant at Khondbond Iron Ore Mine is one of the largest Iron Ore Processing plant in India having a capacity of 8 million tons per annum.

Human Anticollision in stacker

The innovative approach to eliminate the human collision with stacker while moving forward and backward directions. Safety compliance increased and eliminates the collision of human with stacker.





Installation of 3D Lidar

Smart Barrication

Smart fencing is implemented in the conveyor, take-up pulley area, and head end. Now conveyor will start only after hard barricading is done and closed if anyone removes barrication.

Auto Lubrication System for Conveyor Belt

Enhance safety by eliminating human-machine interface. Status can be checked over mobile using Bluetooth. Enhance the life of the Equipment's.

High-rate Thickener

Sustainable water management solution.

High-rate Thickener

Drilling & Blasting 07

Ore bodies at Khondbond Iron Mine are developed by a series of benches of 10 meters in height. Shovels of 5.9 Cu.M capacities and dumpers of 100 tonnes capacities are being deployed.

Drilling is done by 165 mm diameter drills and blasting is done using and SME explosives.

The blasted ore is handled by a Shovel-Dumper combination and transported to either ore stockpiles or directly fed to the existing processing plant and new crushing & washing plant.

Safety initiatives in Drilling & Blasting

- Drills have been provided with AC Cabins and inbuilt noise reduction facilities.
- Sound Proofing of cabins and control rooms.

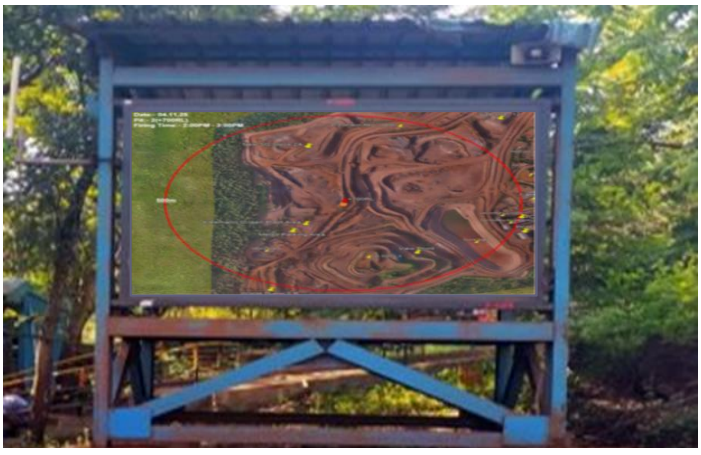
Radio Remote Control of Smart Drill

The operation of drill machines in mining faces has many hazards associated with it. The main hazard is falling from the edge of a bench which may result in serious injury to the operator and property damage.

The hazard can be reduced using a radio remote control which eliminates the need for the operator to be in direct contact with a running machine. This means the operator can position themselves in a safer manner, farther away from narrow mining faces and vibrations. Operating by radio remote control also allows the operator to move more freely, enabling him/her to gain the best viewpoint of the work being performed.

LED Display board:

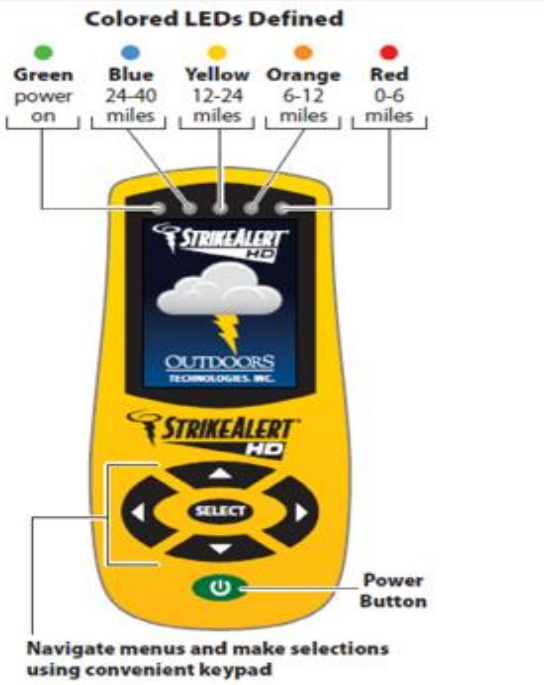
Blast communication is displayed in digital LED display board at the entrance of Khondbond Iron Mine Pit-1, 16D Gate – 2. All manpower, who are coming to KIM on everyday will have awareness on blasting planned in KIM. The blast image also will be displayed on LED display board that shows 500m danger from the blasting face.



LED Communication Display board

Introduced blaster for the initiating the electronic detonators after phase out of electric detonators and improving safety.

Strike Alert to predict lightening: Prediction of lightening during blasthole charging which helps in taking preventive action..



·At Khondbond Iron & Mn Mine, explosives are handled with the utmost caution. The entire process is carried out with the assistance of security personnel and competent department staff.

Safe priming, surface connection with loggers and testers, an integrated weighing system in SME trucks while charging, and vibration monitoring at the time of blast are all part of the handling standard operating procedure.

When handling explosives, all rules and guidelines are strictly adhered to and incorporated into the SOPs to prevent any type of accident.

Laser device to measure depth of drill holes

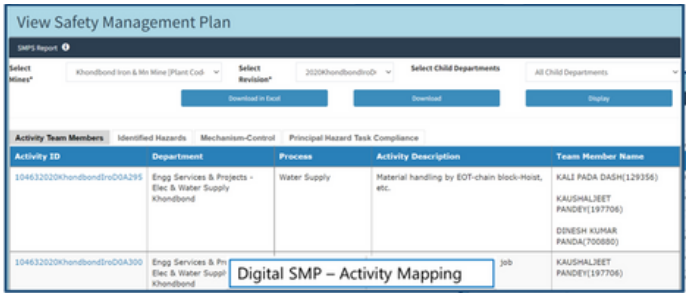
SME charging with SME truck, inbuilt with weighing system

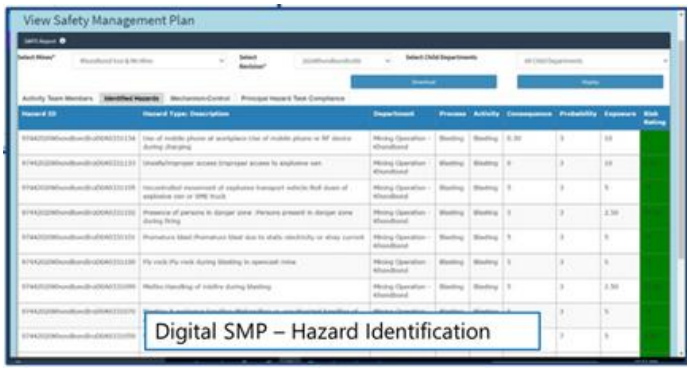
Cable Drum for rolling harness wire: Reduction in Mean Blast Cycle Time

Provision of security gunmen with explosive van

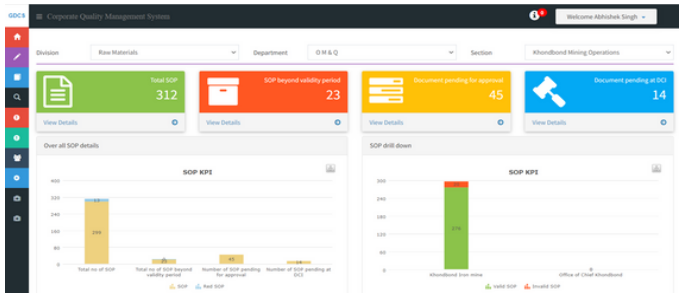
SOP & SMP Implementation 09

Implementation of digital SMP

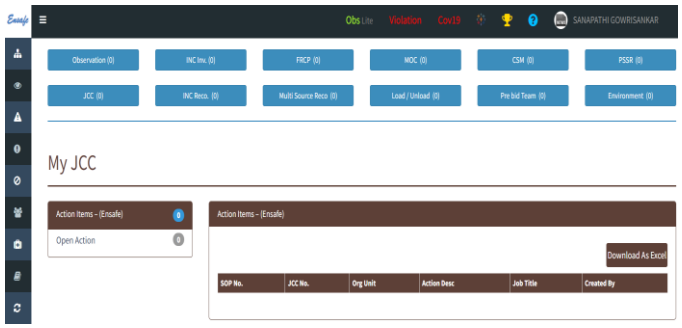




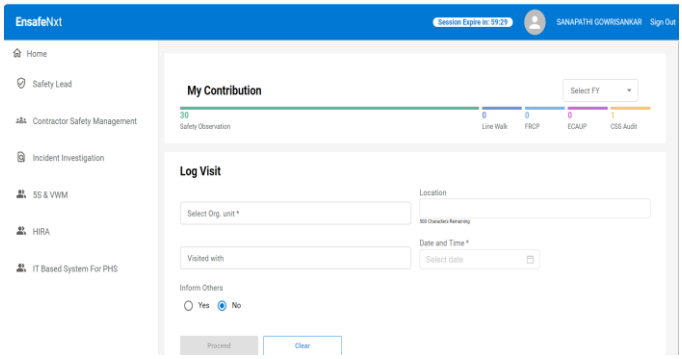
Online portal for SOP management



Ensafe portals for Monitoring of safety



Safety compliance – SOP's & Workings



Safety visits & CSM activity logging

Fleet Management System for real time monitoring of operational and safety aspects of processes

Statutory Manpower & Training Facilities

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Statutory Manpower List

SN	Designation	Nos
1	Agent	1
2	Manager	1
3	Assistant Manager	15
4	Engineer	4
5	Surveyor	1
6	Mine Foreman	11
7	Mining Mate	22
8	Blaster	3
9	Engineer - Ele Safety Officer	1
10	Welfare Officer	1

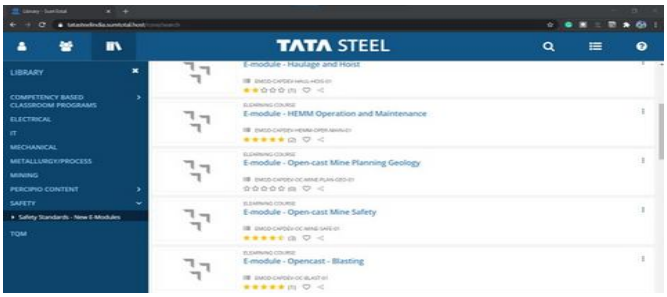
VTC: Training Facilities

All staff members and employees are provided several training and skill development facilities to enhance their operational and safety competencies

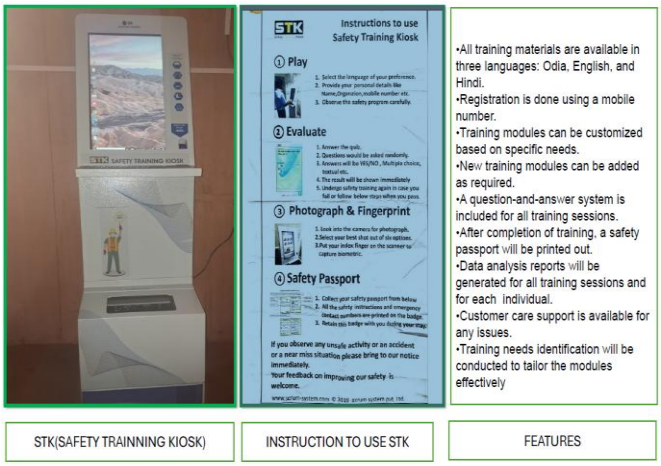
Operational and skill development training

Simulator training for HEMM operations

Mechanical simulation Labs



E Learning Courses on Safety



STK (Safety training Kiosk) installed

Dust Control, OHS and First Aid 11

Dust Control System

Some of the major initiatives taken at KIMM are as follows:

- Wet Drilling for dust suppression.
- Mechanized Wheel washing Facility with recirculation tank.
- Dry Fog System has been installed for dust suppression in all the Crushing & Screening Plant and Material Handling Systems.
- Tarpaulin covering for mineral movement.
- Mist-type mobile water sprinklers of 50 KL capacity are being used around the crushing and screening plant, loading & unloading area, and on haul roads.

Dust Extractor

Wheel Washing Facility

Water Sprinkling at Dumping point in Wet Beneficiation plant

Mist canon to control fugitive dust in mine phases

Vacuum Cleaning Machine

Road Sweeping Machine

Open Fitness Centre

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Health and Safety Policy

Tata Steel's safety, well-being and occupational health ('Health and Safety') responsibilities are driven by our commitment to ensure zero harm to our employees, other people we work with and society at large. We recognise Health and Safety as an integral part of our business and activities within our control in the value chain.

We believe that:

- **All injuries and occupational illnesses are preventable.** We shall provide safe and healthy working conditions for our workforce.
- **Everyone has a role in working towards injury and ill-health prevention.** We shall support those with responsibilities for Health and Safety to ensure they have the right level of resource, competence and confidence to work towards our commitment to zero harm.
- **Our commitments shall be demonstrated through visible, felt leadership.** We shall demonstrate the behaviours we should expect to see from others through visible and active engagement.
- **Working safely is a condition of employment.** We shall empower every worker with the confidence to stop work in any situation where they feel their Health and Safety is at risk without fear of reprisal. Workers shall be encouraged to challenge conditions and unsafe acts that place others at risk.
- **Working towards the elimination of hazards and controlling our risks is paramount.** We shall provide the necessary support that enables others to identify risks and contribute towards the reduction of these risks.
- **Our management system shall support a culture of learning and improvement.** We shall share details of incidents and lessons learned in all areas of the business where applicable.
- **Involvement of the workforce is key.** We shall enable effective means of engagement, consultation, and participation with our workers and their representatives on Health and Safety matters.

This policy is applicable for Tata Steel Limited and covers workforce across its operating locations.

We commit to the continuous improvement of our Health and Safety performance. In this regard:

- We shall set objectives and targets, plan our improvements, and ensure that standards and systems are implemented within the business. Performance shall be monitored and communicated on a regular basis and acted upon where we fall short.
- We shall go beyond compliance of relevant legal and industry standards, with the aim of becoming a leading organisation in terms of Health and Safety performance in our industry.
- We will ensure that the Health and Safety policy is effectively communicated and accessible.

Date : May 23, 2024

T V Narendran
CEO & Managing Director

OHS Policy

First-Aid Facility

First Aid Room

Advanced Life Support Ambulance

Dispensary & ECG Facility

Emergency Preparedness 12

Accident, Emergency preparedness

Mock drills are done in accordance with the risk assessment of all mining activities and are conducted as part of the emergency preparedness plan.

Based on the potential risks involved in the operational activities, an annual mock drill plan is prepared. SOP is also created to handle all potential emergency situations.

Various Mock drills conducted inside mine

Accident Statistics

SN	Parameter	FY' 21	FY' 22	FY' 23	FY' 24	FY' 25	FY26 (till Oct'25)
1	LTIFR	0	0	0.44	0	0	0
2	Lost Time Injury (LTI)	0	0	1	0	0	0
3	First Aid (FAC)	1	1	0	0	0	0
4	Ex-Gratia	0	1	1	0	1	1
5	Medical Case	5	7	1	1	3	7

Innovation & Digitization 13

Innovation

Haul Road Analysis & Control

The system enables the quick identification of haul road undulations in mining using dumper suspension systems and GPS sensors. It correlates suspension pressure variations with road undulation depth.

The identification of the undulation coordinates is performed using Power BI. Visualization of the undulations is done through Google Earth Pro. This innovation reduces the identification to rectification time for haul road undulations from 17 days to just 1 day.

Mechanized stemming truck prototype

Trail of collison avoidance system

Fog vision system

Smart Blast Clearance system Prototype

Mechanized stemming & Smart blast clearance system are the Innovative concepts which was presented with Proof of concept in TATA InnFuze at TATA Group level.

Digitization

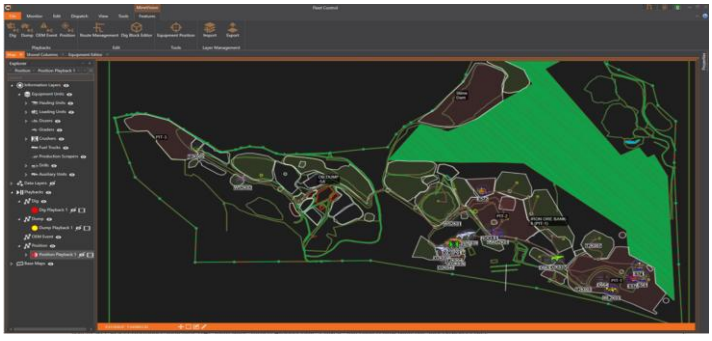
Online Driver Fatigue monitoring system

System can generate real-time data of the signals generated in case of detection of the driver's fatigue. Additionally, the data was stored in Cloud and can access for counseling with Family members. System has 2-Way Communication facility to directly communicate with the control room.

Tracking of driver behavior & actions

Fleet Management System

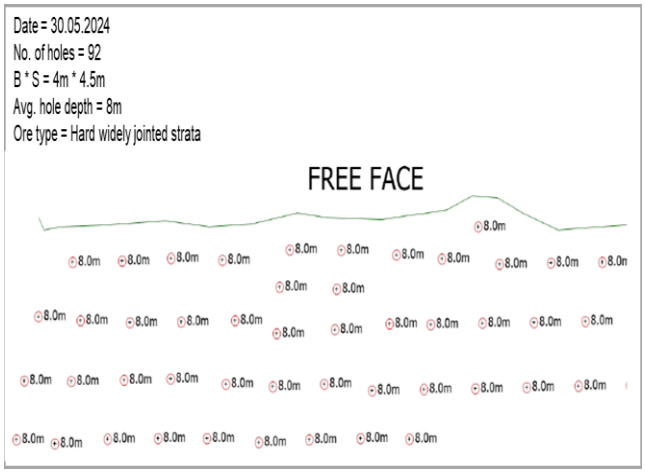
Fleet Management System (FMS) was implemented for improving productivity and efficiency of the employee & equipment.



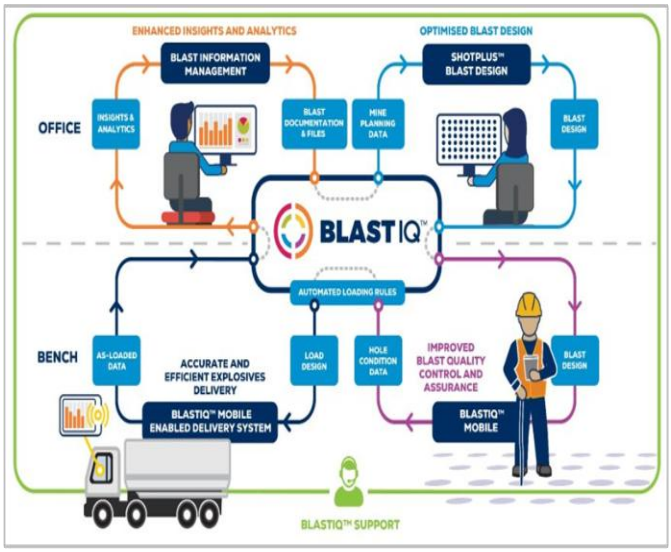
FMS Tracking Screen

FMS was upgraded subsequently with enhanced real time visibility and integration with various tools like Fatigue Monitoring system, VHMS, RTQMS etc. to capture, monitor and analyze various Key KPIs and to enable data driven Decision Making.).

ShotPlus



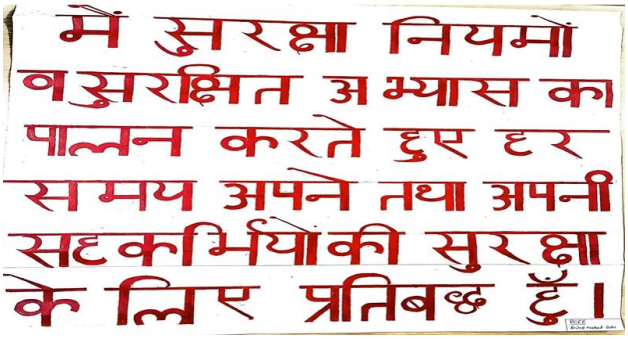
Blast IQ



Publicity & Propaganda | 14

Safety flag hoisting

Safety Posters & Slogan Competition



Safety talk


PARKING
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THANK YOU


KRISHNENDU DAS
BLOOD GROUP-A+
SAROJ KU MISHRA
BLOOD GROUP-B+
NISH RANJAN