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ArcelorMittal Nippon Steel India

13th Edition of CII National Award for Environmental Best Practices 2026

A joint venture between ArcelorMittal and Nippon Steel Corporation

ArcelorMittal NIPPON STEEL

Case Study Presentation By:

ArcelorMittal Nippon Steel India Pvt. Ltd. Hazira Works



Title of the Project : Innovative Conveyor Junction House Star Rating System for Scientific Assessment and Reduction of Fugitive Dust Emissions at AM/NS India, Hazira

Date: 8th & 9th October 2026

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CompanyProfile

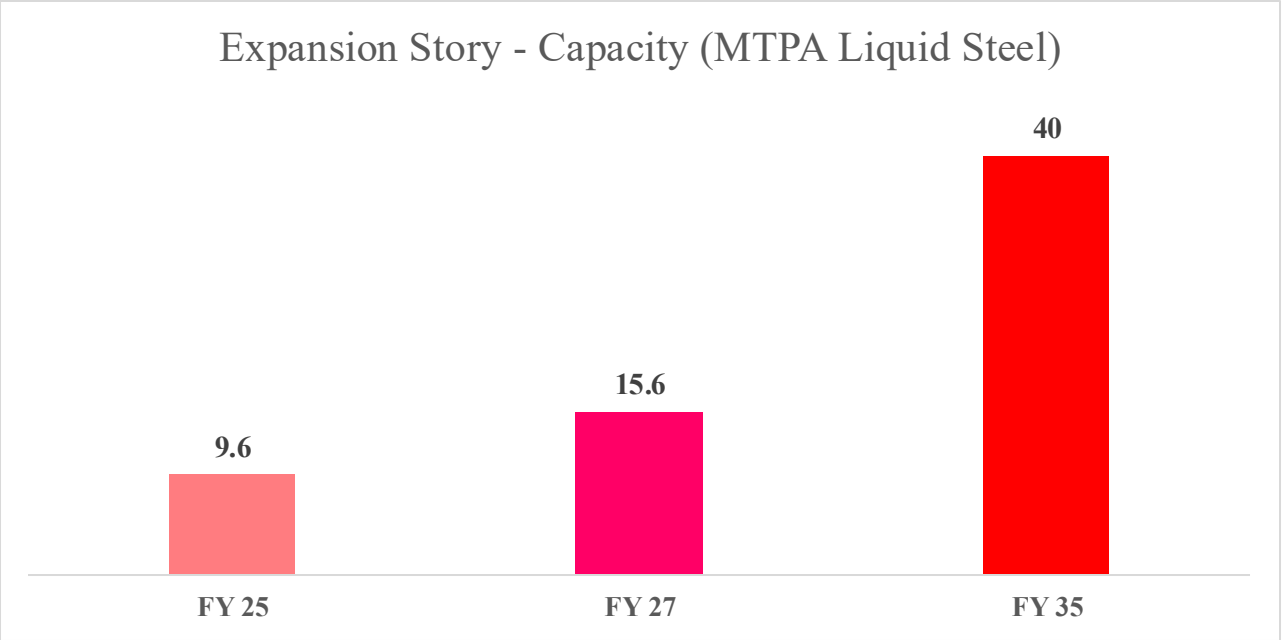
One of India's largest Integrated flat Steel Producers

ArcelorMittal (Europe) + **Nippon Steel** (Japan)

Joint venture since 2019— an alliance of two global steel leaders.

INDIA

Set to become the world's largest integrated flat steel plant at a single location,
with total capacity planned to reach 40 MTPA of Liquid Steel by 2035.



Smarter Steels, Brighter Futures A strong ESG focus, with decarbonization and circular economy at the core.

FLAT-ROLLED STEEL PRODUCTS FOR

- Automotive
- Construction
- Transportation
- Agriculture
- Defense
- Energy

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Title of the Project : Innovative Conveyor Junction House Star Rating System for Reduction of Fugitive Dust Emissions

WHY THE PROJECT? A clear cause-to-action pathway

1 BULK MATERIAL MOVEMENT
Extensive conveyor network transports fine materials

2 FUGITIVE DUST SOURCES
Junction Houses identified as major emission points

3 COASTAL WIND IMPACT
Higher wind speed increases airborne dust dispersion

4 SCIENTIFIC CONTROL
Objective assessment to drive sustained reduction

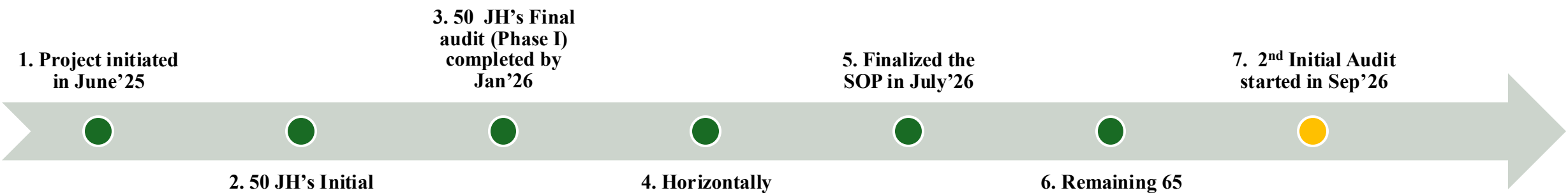
WHAT IS UNIQUE? Three differentiators convert audit findings into measurable improvement

01 FIRST-IN-INDUSTRY FRAMEWORK
9-point audit matrix aligned with CEMA-USA guidance, Scientific and objective assessment.

02 LOW-CAPEX IMPROVEMENT MODEL
Maintenance and operational discipline first. Maximum PM reduction with limited investment.

03 1-TO-5 STAR RATING SYSTEM
Standardized benchmarking across JHs. Visible recognition and continuous improvement.

MILESTONE Phased deployment and recurring audit cycle

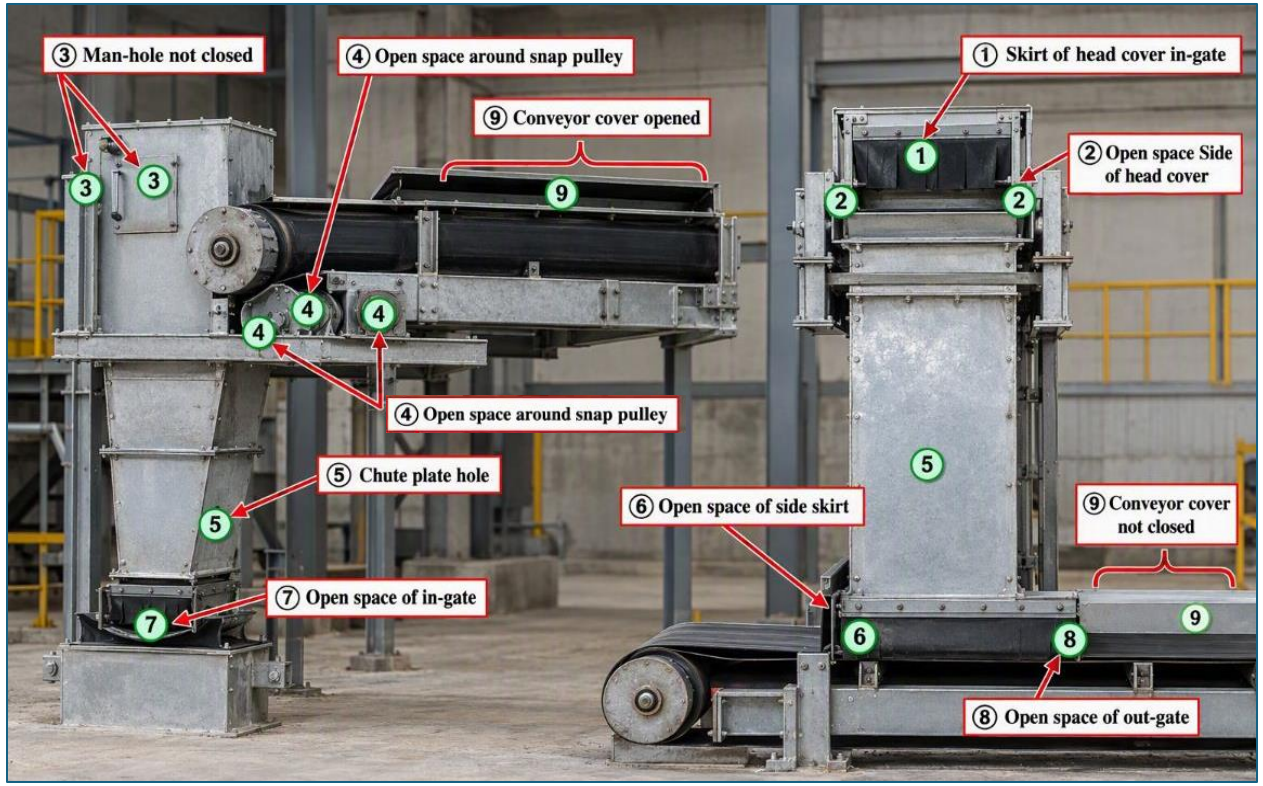


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9-Point of Dust Emission Source

Sr. No.	Point / Location
Source-1	Check in-gate skirt of head cover with respect to the height, openings.
Source-2	Check side skirt of head cover with respect to open space
Source-3	Check manual inspection door if it is closed/open
Source-4	Check snap pulley for open space/Leakage
Source-5	Chute plate to be checked for punctures due to impact of fall of material and thus dust leakage.
Source-6	Check side skirt of the receiving conveyor for open space
Source-7	Check in-gate skirt of tail end for open space & leakages
Source-8	Check out-gate skirt for openings & leakages.
Source-9	Check conveyor covers for ensuring dust confinement

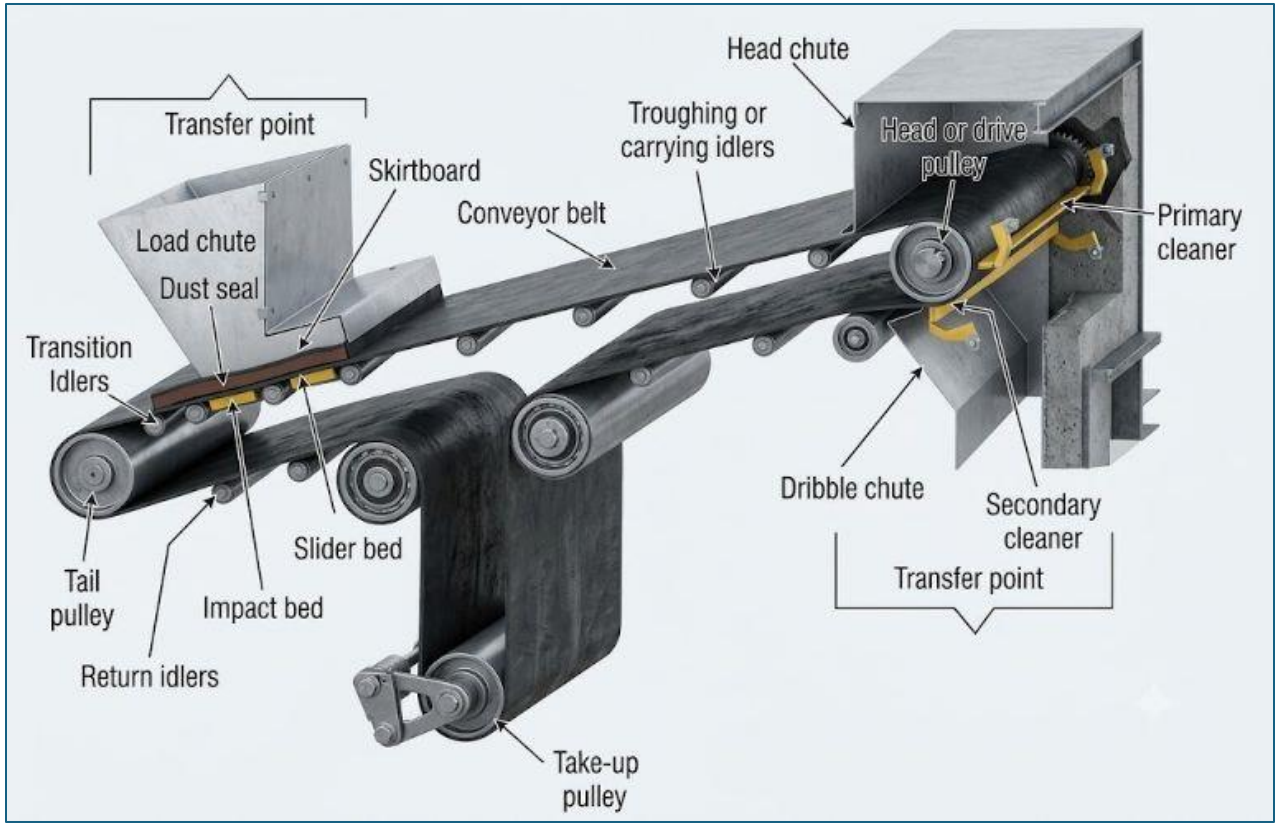
Dust Emission Points in a Conveyor Junction House

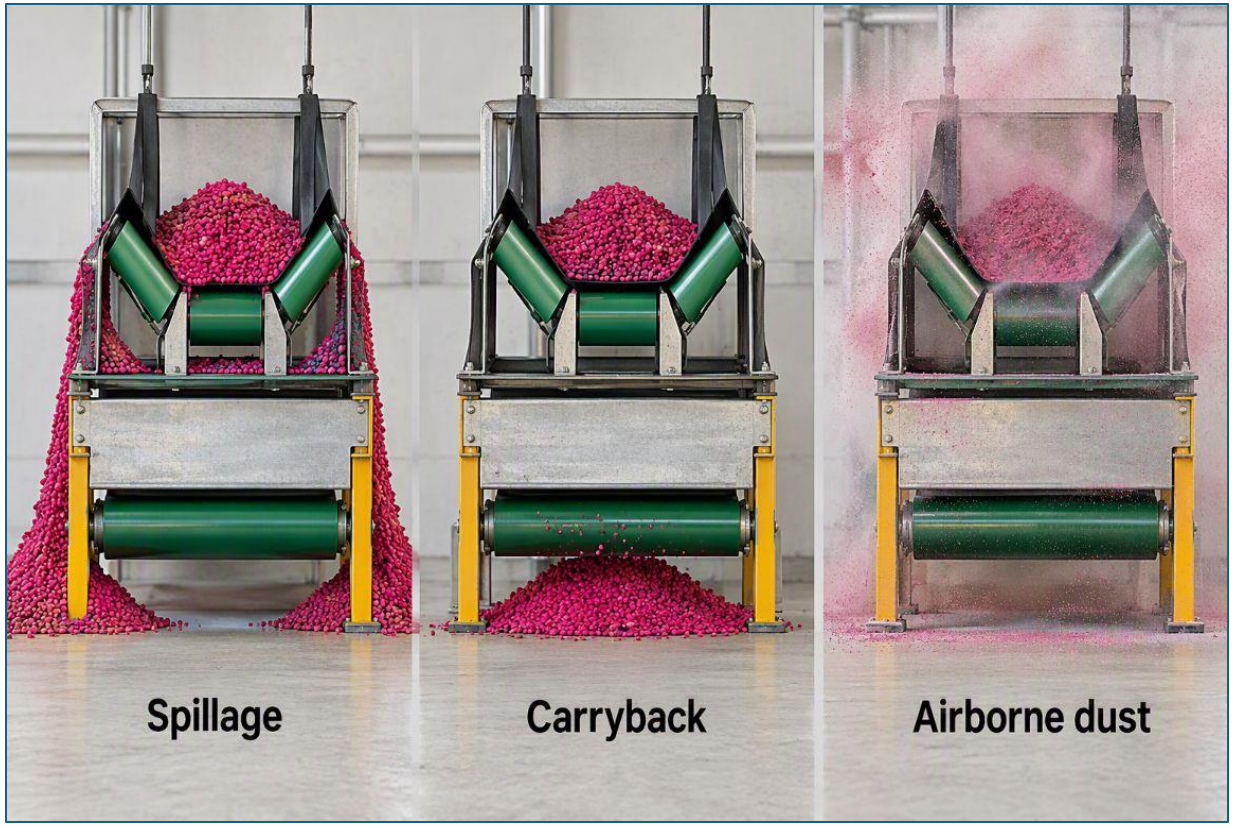


- **09-point sources of fugitive emissions were identified** in the AMNSI Hazira site's conveyor junction house system through rigorous audits and by referencing **Conveyor Equipment Manufacturers Association (CEMA) guidelines, USA**.

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Pictorial View of a Conveyor and Emission Sources





Picture of the typical conveyor Belt

Fugitive dust Emission from Conveyor Belts

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5-Point of No Resource Waste (NRW)

01

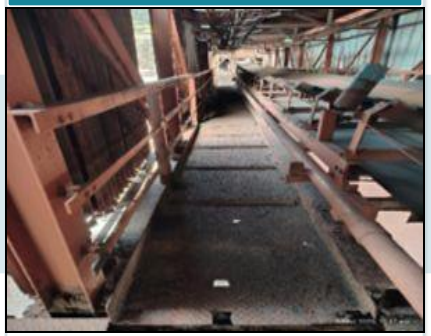


Staircase & Approach Area

If material/dust accumulation found blocking the staircase or spillage over ground **score** will be **0 (ZERO) else 20.**

0 MATERIAL FOUND | 20 CLEAR

02



Walkway – Left Side

If material/dust accumulation found blocking the staircase or spillage over ground **score** will be **0 (ZERO) else 20**

0 MATERIAL FOUND | 20 CLEAR

03



Walkway – Right Side

If material/dust accumulation found blocking the staircase or spillage over ground **score** will be **0 (ZERO) else 20**

0 MATERIAL FOUND | 20 CLEAR

04



Conveyor cover top

If material/dust accumulation found blocking the staircase or spillage over ground **score** will be **0 (ZERO) else 20**

0 MATERIAL FOUND | 20 CLEAR

05



Head / Tail end pulley

If material/dust accumulation found blocking the staircase or spillage over ground **score** will be **0 (ZERO) else 20**

0 MATERIAL FOUND | 20 CLEAR

- **Audits of the junction house also identified 05 critical locations** (staircase/approach, conveyor walkways, conveyor top, and head/tail pulley) **where fugitive dust emissions and resulting material wastage were settling.**

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SCIENTIFIC STAR RATING SYSTEM

1 Inspect & Score

60% WEIGHTAGE

➢ **9 Point Source Score (A)**

Each point's Score for (A) is determined as: 100 ÷ Applicable Points (out of 9).

E.g. : If all 09-points are applicable and 6 points are ok then each point will get 11.11 and total score is
(A) = 66.66

➢ **In Additional :**

❑ **Dust-control systems :**

•Prevention
• Extraction
• Suppression

Output: 9 Point Source Score (A)

2 Check No Resource Waste (NRW)

40% WEIGHTAGE

➢ **No Resource Wastage (B)**

Each point's Score for (B) is determined as: 100 ÷ Applicable Points (out of 5).

E.g. : If all 05 points are applicable and 2 points are ok then each point will get 20 and total score is (B) = 40

Evaluate five designated locations for:

- No material spillage
- No dust leakage
- No avoidable resource loss

Output: NRW Score (B)

3 Calculate Final Score

➢ **Weighted score combines both assessments:**

FINAL SCORE

$$C = (A \times 60\%) + (B \times 40\%)$$

Illustrative calculation :

A = 60% | B = 40%

$$C = (A \times 0.60) + (B \times 0.40)$$
$$C = (66.66 \times 0.60) + (40 \times 0.40)$$
$$C = 39.996 + 16$$
$$C = 55.996$$

FINAL SCORE (C)

4 Assign Star Rating

➢ **Performanceclassification :**

5 STAR	≥ 85%
4 STAR	≤ 76 – 85%
3 STAR	≤ 36 – 75%
2 STAR	≤ 26 – 35%
1 STAR	≤ 25%

Final Star Rating:
3 Star ★★★

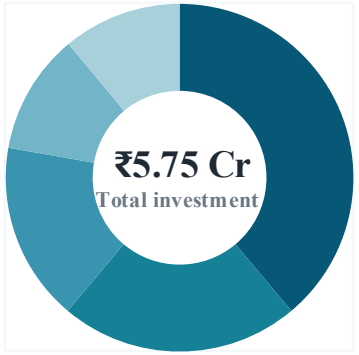
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Tangible Benefits (Measurable)

- **Reduction in fugitive dust emissions at source.**
- **Productivity: Increase in productivity due to reduced downtime and a cleaner working environment.**
- **Project Cost & Saving Summary :**

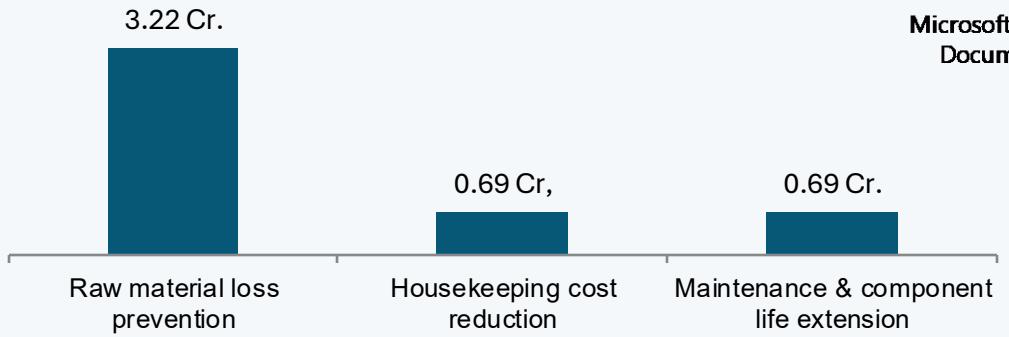
TOTAL INVESTMENT	ANNUAL SAVINGS	ANNUAL ROI	PAYBACK PERIOD
₹5.75 Cr	₹4.60 Cr/year	80%	15 Months
Total 115 junction house	Recurring tangible benefit	Annual savings ÷ investment	Equivalent to 1.25 years

BUDGET BREAKUP



Gap closure & Sheeting	₹2.59 Cr
Dust suppression & ventilation	₹1.15 Cr
Structural & housekeeping	₹0.86 Cr
Conveyor skirting & curtains	₹0.58 Cr
Contingency	₹0.57 Cr

ANNUAL SAVINGS BREAKUP



Microsoft Word Document

70% of savings comes from raw material loss prevention.

ROI & PAYBACK :

Annual ROI

80%

₹4.60 Cr ÷ ₹5.75 Cr × 100 = 80%

Payback Period



₹5.75 Cr ÷ ₹4.60 Cr/year = **1.25 years (15 Months)**

Investment recovered in 15 months, followed by ₹4.60 Cr/year recurring savings.

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Intangible Benefits (Qualitative)

VALUE CREATION PATHWAY

01 Workplace Environmental Health & Safety

Cleaner air, lower dust exposure and improved visibility create healthier working conditions.

02 Regulatory & Consent Compliance

Supports Compliance with NAAQS, MoEFCC and Environmental Clearance requirements.

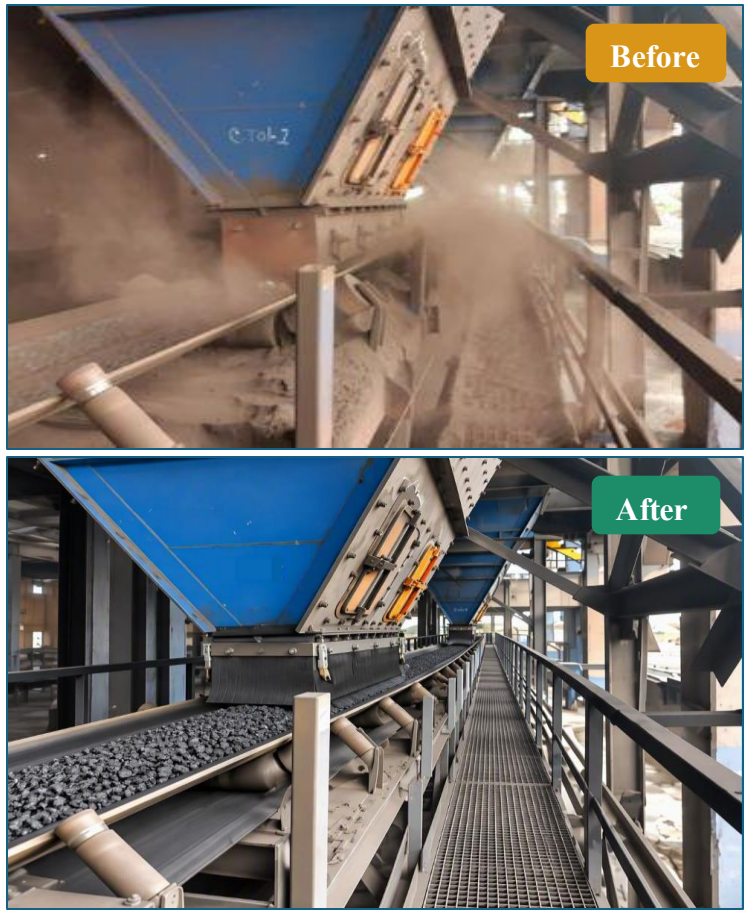
03 Continuous Improvement & ESG Culture

The 5-Star system strengthens ownership, accountability and ISO 14001 alignment.

04 Employee Morale

Reduced fugitive dust builds employee confidence and pride in the workplace.

VISIBLE TRANSFORMATION



Dust control delivers measurable improvement beyond financial returns.

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Additional Action Taken for Reducing Fugitive Dust Emission



1 Installation of Bag Filter with capacity 1100000 Nm3/hr. in SMP-1 (3 Nos,)





2 Water Sprinkler Installation on the conveyor of Oxide & Flux unloading route to reduce Fugitive Dust Emission at Source.



3 Fog Cannon installation at Oxide Yard.





4 New Dedusting System with Pulse Jet Bag Filter installed in Lime Plant-B (6 Nos.).



5 Water sprinkler facility installed at PORT Coal Yard.

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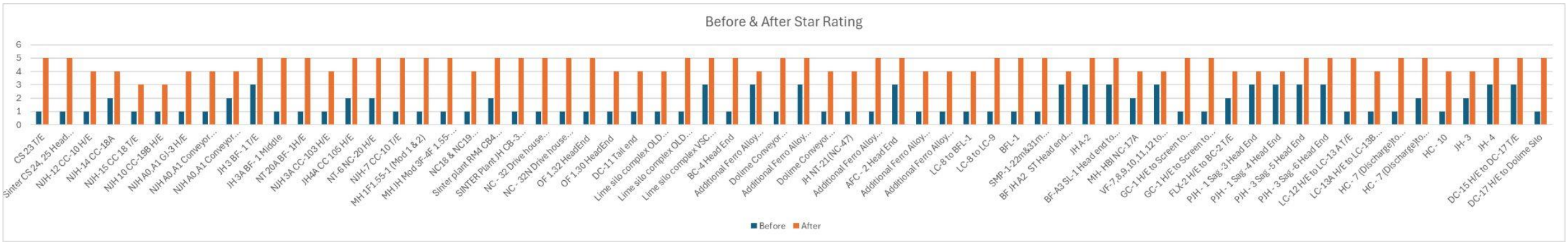
Comparison (Before & After)

➢ **Key Takeaway:** The systematic implementation of control measures at all 09 identified emission points resulted in a fundamental change, verified by data: The environment rating improved from 0 Star to 5 Star, proving the effectiveness of the structured abatement strategy.

Metric Category	Metric	Before Implementation	After Implementation	Improvement
EHS (Health)	Work Zone Dust Concentration (PM10/Work Zone Monitoring)	High (Exceeding Safe Limits)	Low (Within Safe Limits)	**Significant Reduction**
Operational (Efficiency)	Dust Cleaning Frequency	Daily (4 hrs/day)	Weekly (1 hr/day)	**82 % Reduction in Downtime**
Compliance Rating	Environment Rating of Junction House	1-2 Star (<25%)	4-5 Star (~100%)	**Compliance Achieved**







Note : First 50 JH's Initial and Final Audit Report

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Videos (Before & After)



Video : JH Name: PJH-3 (LDCP-B) (Initial Audit)



Video : JH Name: PJH-3 (LDCP-B) (Final Audit)

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Replication & Scalability : Star Rating Framework

REPLICATION ENGINE

01 UNIVERSAL NEED
Controls dust, spillage, housekeeping gaps and occupational exposure at conveyor transfer points.

02 COMMON STANDARD
A uniform checklist, score bands and visual criteria make assessment consistent across every unit.

03 EASY DEPLOYMENT
Clear roles, simple controls and corrective-action tracking support rapid replication.

04 DIGITAL GOVERNANCE
Dashboard and KPIs create transparent performance visibility.

CROSS-INDUSTRY APPLICATION : STEEL • CEMENT • MINING • THERMAL POWER • PORTS • FERTILIZERS • LOGISTICS

SCALE-UP PATHWAY

1. **Deployment:** Implement the precise, validated **09-Point Control Measures** across **all similar conveyor junction systems** in the site.
2. **Goal:** Achieve **100% compliance** with the **09-Point checklist** and the **05-Star Rating** system in all critical transfer areas.

SCALABILITY OUTCOME ▪ **Faster deployment** ▪ **Consistent assessment** ▪ **Comparable performance** ▪ **Sustained improvement** ▪ **Enterprise adoption**

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Challenges Faced & Countering Strategies in the Conveyor Junction House Star Rating System

01 TECHNICAL CHALLENGE

KEY ISSUE

Air turbulence at chutes, coastal wind dispersion and multi-material variability.

COUNTERING STRATEGY

A. Modular skirt sealing, soft-loading chutes and secondary containment flaps.

B. Standardized 9-point inspection protocol with impact-bed checks.

02 ADMINISTRATIVE CHALLENGE

KEYISSUE

Initial resistance from operations and maintenance teams due to production priorities.

COUNTERING STRATEGY

A. Single-point owners for every Junction House across O&M divisions.

B. Transparent 1-to-5 Star dashboard linked with KPIs and leadership reviews.

03 MAINTENANCE CHALLENGE

KEY ISSUE

Rapid wear of skirts and liners, belt sagging and shortages of critical sealing spares.

COUNTERING STRATEGY

A. Dedicated safety stock for high-wear spares such as skirtings, scrapers and liners.

B. Standardized quick-release sealing systems replacing ad-hoc repairs.

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Achieving national benchmarks/Standards

01

Regulatory & Statutory Compliance

- NAAQS, 2009
- Environment (Protection) Rules, 1986
- Factories Act, 1948

02

Industry Standards

- MoEF&CC Notification
- G.S.R. 277(E)
- Integrated Iron & Steel Plants

03

Consents & Directives

- Environmental Clearance (EC)
- Consent to Establish (CTE)
- CC&A conditions

04

Engineering & Management Standards

- ANSI/CEMA 402 guidelines
- ISO 14001 EMS
- ISO 45001 OHMS
- Continual improvement

NATIONAL BENCHMARK PERFORMANCE

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Priority Plans & Resource Requirement (+1 & +2 Year)

YEAR +1

01

FAST-TRACK FOUNDATION

2026–2027

1. **Full Automation**
   Automated fogging systems at all 115 Hazira JHs
2. **Training & Education**
   Mandatory training for Maintenance & Operations teams on the audit checklist and SOPs.
3. **Dedicated Capability**
   Deploy 4 dedicated EHS auditors

BUILD TO SCALE

YEAR +2

02

INTELLIGENT SCALE-UP

2027–2028

1. **AI Vision Analytics**
   Camera-based spillage detection systems
2. **Global Deployment**
   Roll out 09-point SOP across global joint ventures
3. **Digital Platform**
   AI vision platform software for scale-up

Additional Resource Required — 4 EHS Auditors → AI Vision Platform → Global Rollout

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Top 10 Best Practices for (+1 & +2 Year Roadmap)

+1 YEAR | FOUNDATION & CONTROL

01 **Star Rating Monitoring**
Monthly scientific assessment

02 **Data-Driven Dust Management**
Dashboard tracking of dust and audit trends

03 **Predictive Maintenance**
Proactive upkeep of conveyors, chutes and seals

04 **Mandatory Training**
Conducting training session with all the Operation and maintenance team member.

05 **Ownership & Accountability**
Area RACI linked with environmental KPIs

+2 YEAR | SCALE-UP & EXCELLENCE

06 **Zero Leakage Philosophy**
Eliminate spillage and visible dust at source

07 **Engineering Control Upgradation**
Strengthen enclosure, extraction and suppression

08 **Best Practice Replication**
Scale proven improvements across plants

09 **Competency Development**
Structured training for O&M teams

10 **Continuous Improvement Culture**
Annual rating improvement toward 5-Star

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Major learnings from the project implementation

01 Cross-Functional Management

Operations, Maintenance, HSE and Commercial aligned for seamless execution.

02 Bottom-Up Team Building

Ground-level technicians co-created audits, ownership and practical solutions.

03 Digitalization Initiative

AI-based PTZ monitoring, instant alerts and a comparative star-rating dashboard.

04 Standardization over "Jugaad"

Permanent standards and buffer-stock discipline replaced temporary fixes.

05 Source Prevention & Root-Cause Control

Proactive sealing and belt alignment prevent accumulation and secondary hazards.

DIGITALIZATION IN ACTION

Detect → **Notify** → **Compare** → **Improve**

- AI-enabled monitoring converts fugitive-dust observations into rapid control action and measurable junction-house performance.



Live dashboard and comparative trend view



Automated mail alert for timely corrective action

CORE TAKEAWAY : People alignment + digital visibility + standardized root-cause control = sustainable dust-emission reduction

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Thank You

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