Enhancing Shopfloor safety through I4.0

IPPTA Zonal Seminar

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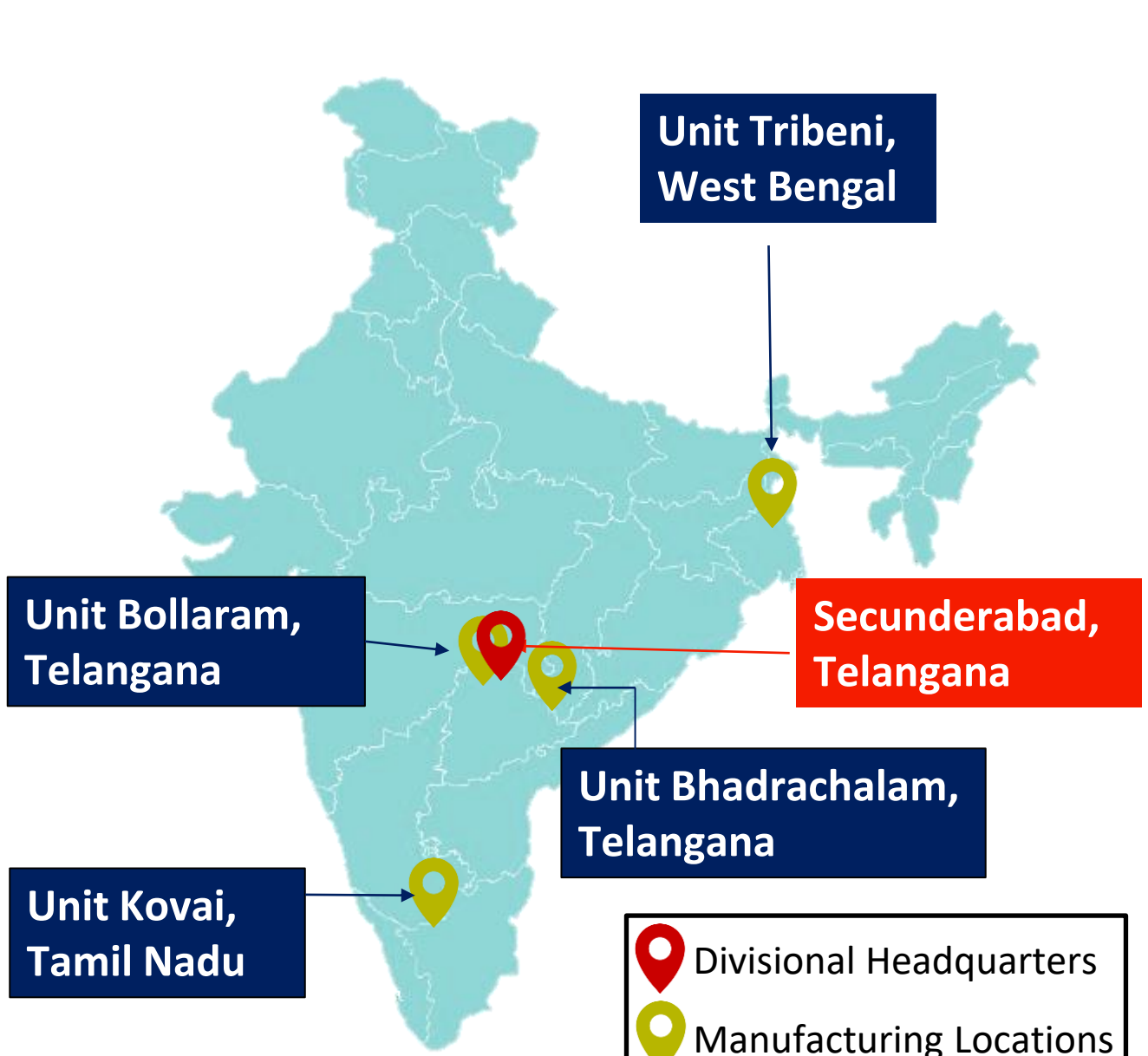
26th Jul'24

Company Introduction



4 World class manufacturing Units

India's first ECF bleaching line

In-house ClO_2 and Ozone plant

Asia's first in-house Mechanical Pulp plant

Forest Stewardship Council (FSC) certified units

- **Environmentally appropriate**
- **Socially beneficial**

FSC

***ECF:** Elemental Chlorine Free*

Company Introduction

Cumulative plantation area
4,22,244 Ha (as on Mar,2023)

CO2 sequestration
59.92 lakh ton (250 % Carbon Positive)

ITC IS THE ONLY COMPANY IN THE WORLD OF COMPARABLE DIMENSIONS TO BE

18 YEARS IN A ROW

21 YEARS IN A ROW

16 YEARS IN A ROW

As on 31st March 2023

Our Products

Paperboards

Plastic Substitution Products

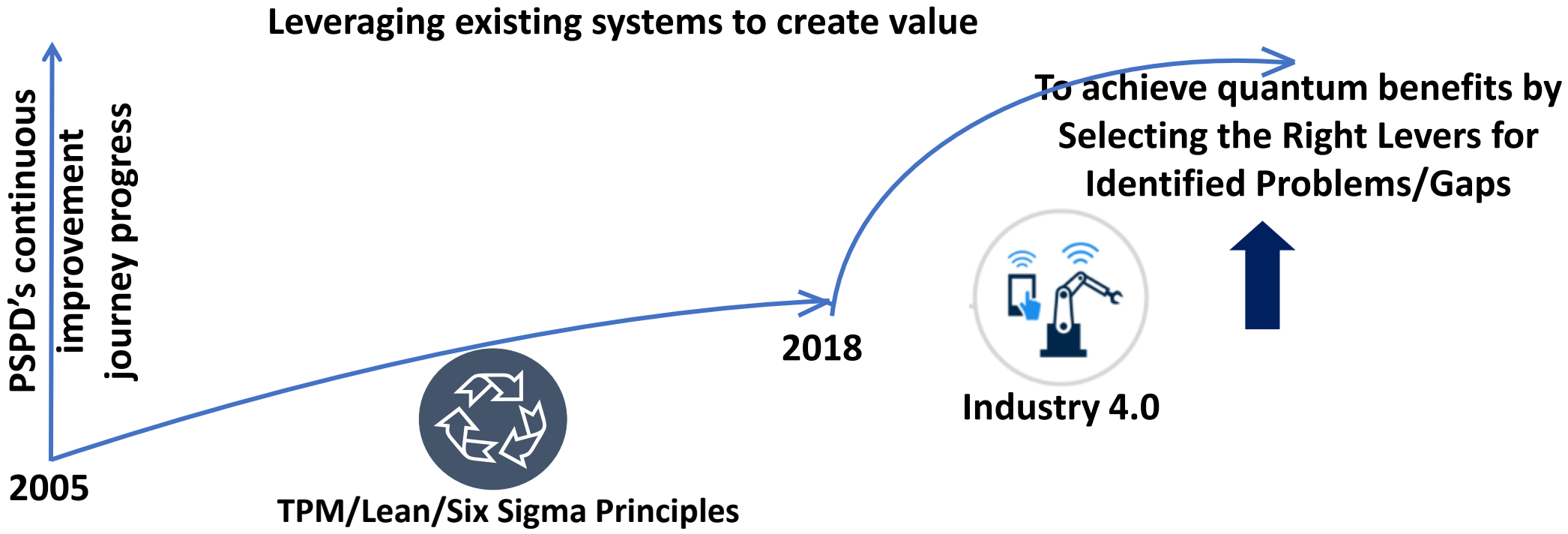
Papers

Specialty & Graphic Boards

Industry 4.0 & AI in Action for Shopfloor Safety Improvement

@ ITC Paperboards & Specialty Papers Division

Case for Digital Adoption



Integrated approach focusing on Assets, People, Processes, Product and Place concurrently to achieve Continuous improvement

Industry 4.0 / Digital Adoption

Plantations & RM

Pulpmills & Recovery

Procurement

Power & Utilities

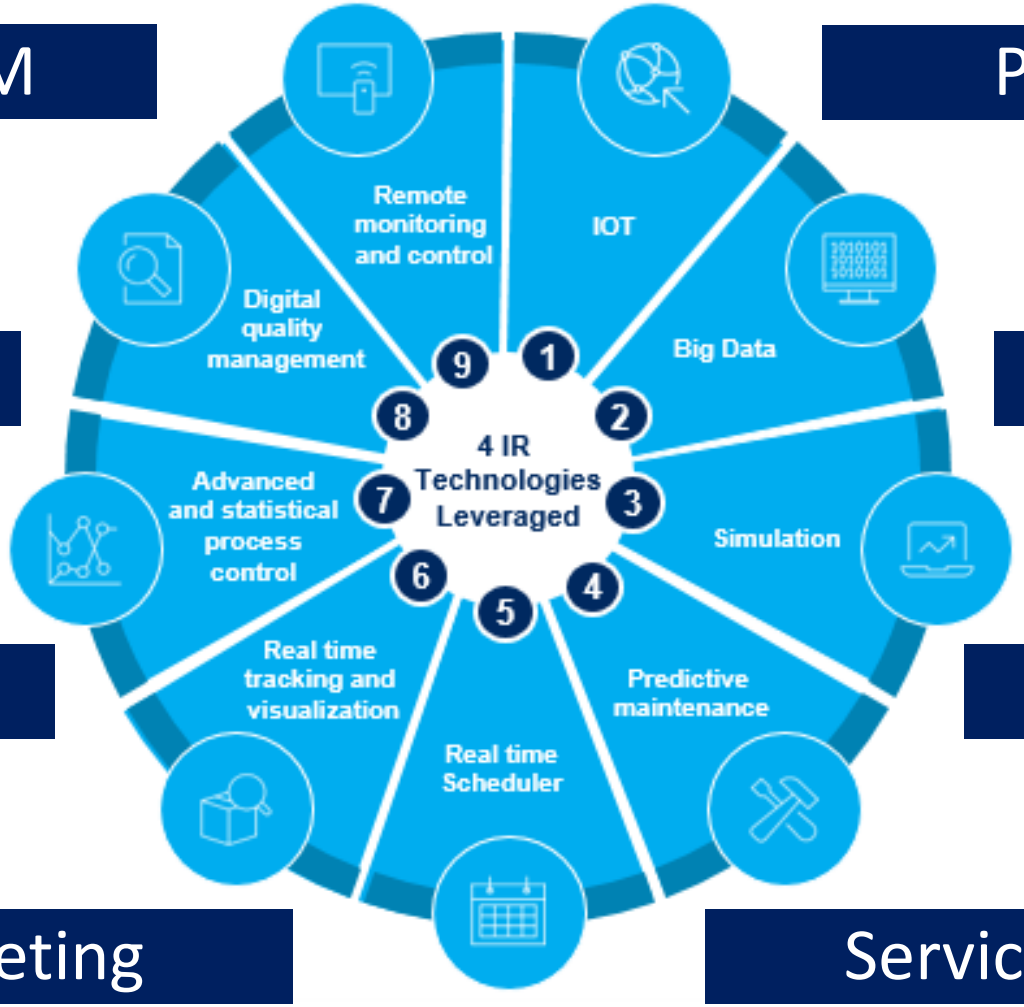
Supply Chain

Paper Machines

Sales & Marketing

Service Functions

Safety

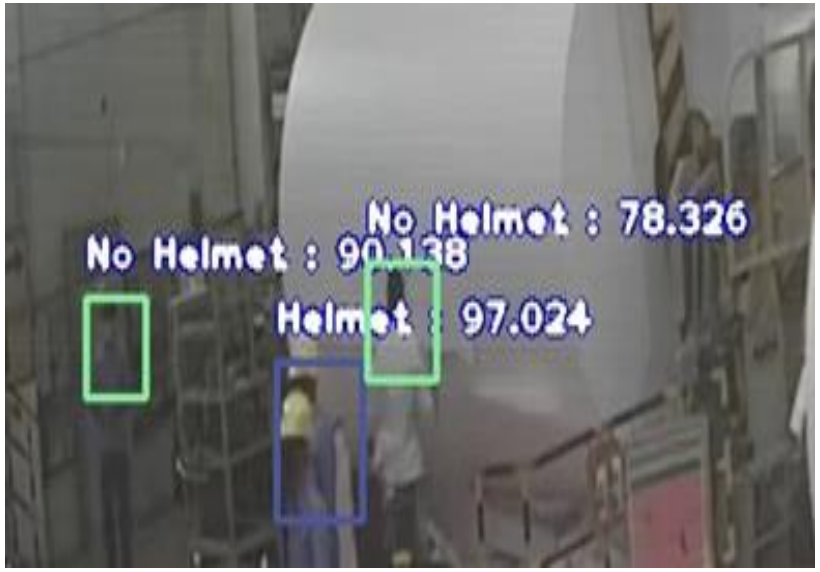


1 Safety Helmet compliance Detection

Existing CCTV
Cameras in shop floor

Instant email alert &
Daily Reports

Analyzing behavior
patterns & Counsel



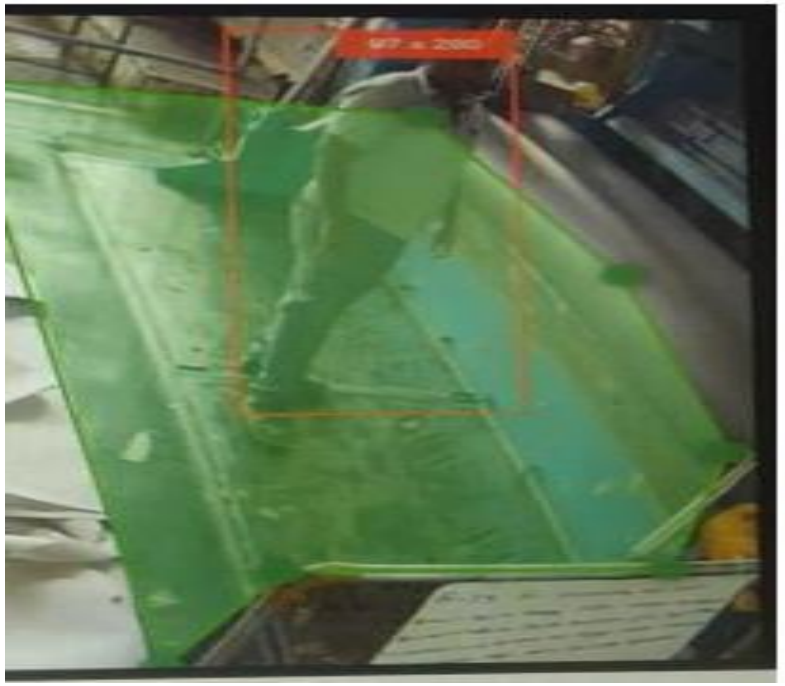
- First Pilot through digital for safety improvement
- Implemented in FY 21
- AI Models developed by Inhouse development
- Safety helmet adherence improved from 70% to 85%

2 AI Camera based safety interlock for Rewinder operations

Artificial Intelligence enabled Camera

In use since FY 22

Installed in all Rewinders



Region of interest configured for Rewinder Lowerator

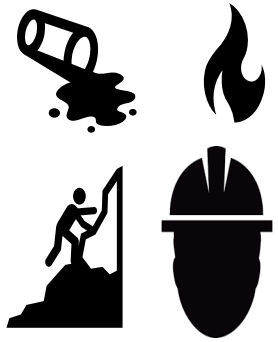
Technology Partner supported intervention

Hardwired safety interlock from the Camera – in event of Human entry

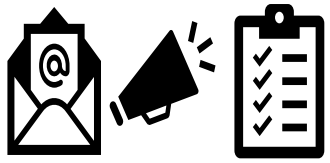
Zero safety incidents reported from Rewinder lowerator areas since FY 22

3 Video analytics for safety Monitoring

Existing CCTV Cameras

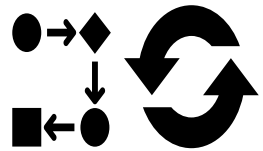


Detect unsafe acts, unsafe conditions

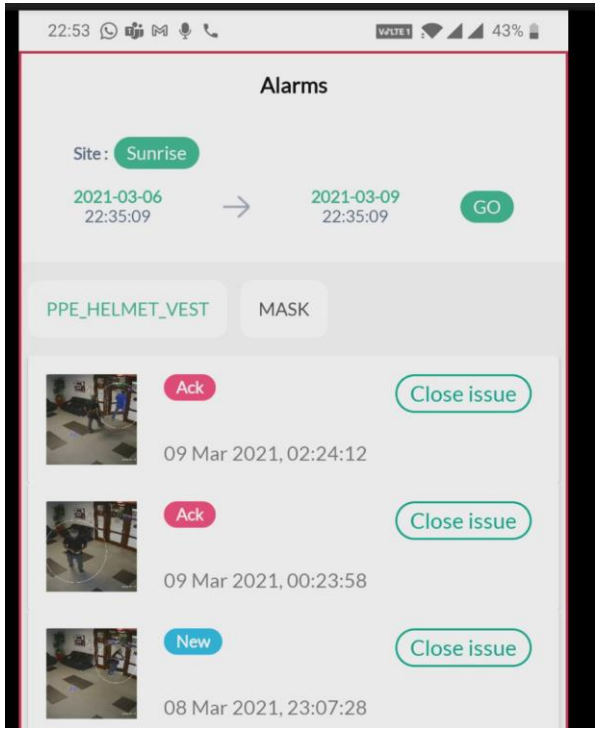


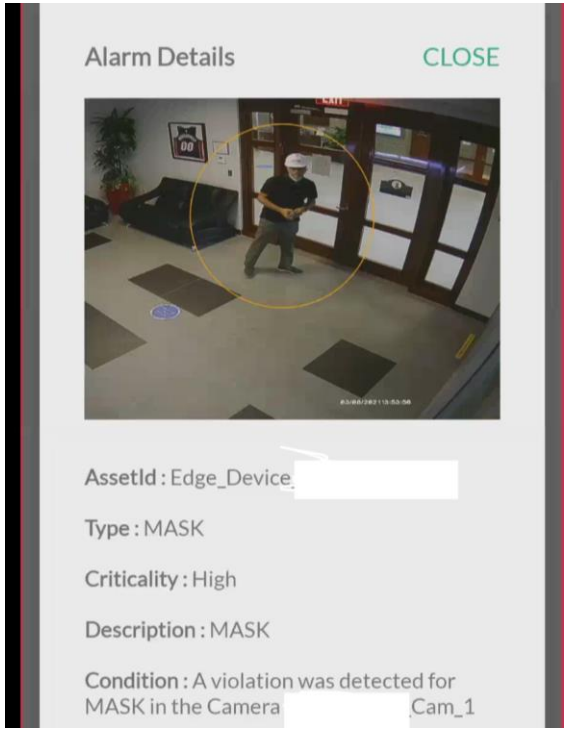
Inform supervisors, counsel worker, incident log

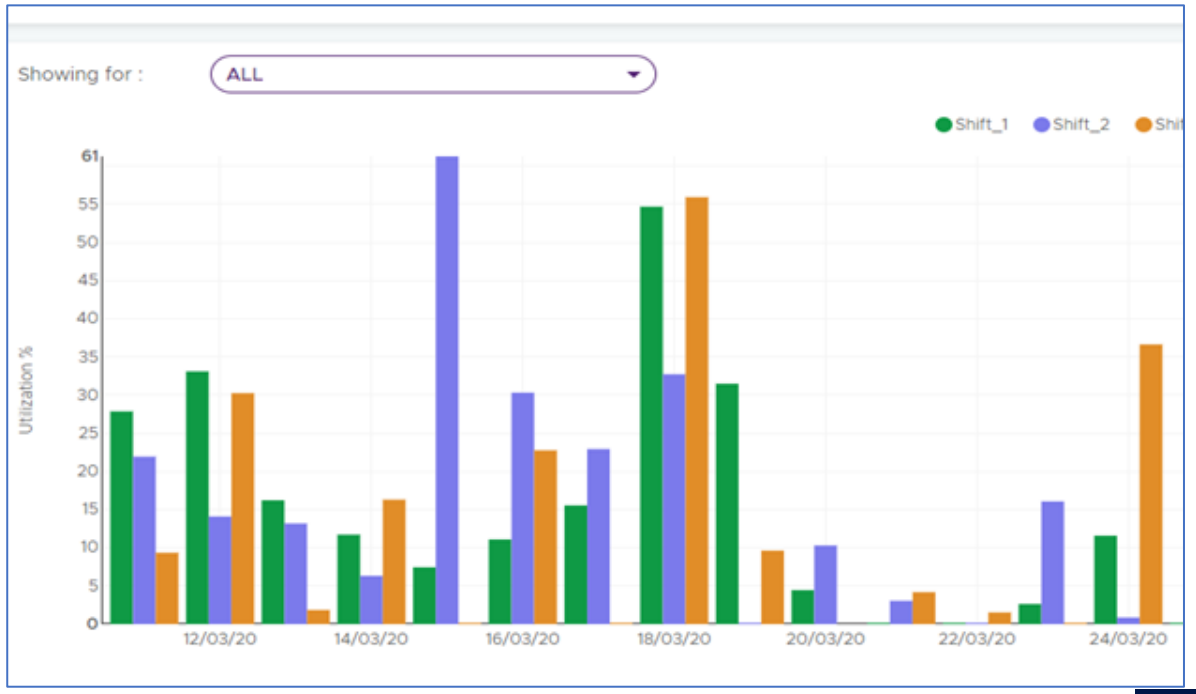
Trend analysis to understand WHY



Update Processes & validate effectiveness







3 Video analytics for safety Monitoring

UNSAFE ACTS

1. Falls or stumbles Crash helmet
2. Unconscious / Prone individuals
3. Mishandling of goods (Throwing etc)
4. Path taken through facility by workers
5. Person(s) observed running
6. People jumping or climbing up/down
7. Vehicle Speed exceeds designated speed limit
8. Working under suspended load

UNSAFE CONDITIONS

1. Maximum stack height exceeded for pallets / Goods
2. Open flames and / or smoke visible
3. Person in Line of fire of Moving Vehicle.
4. Prohibited item being carried (Large Package being carried on a two wheeler or bicycle)
5. liquid spillage / leak
6. More Crowd
7. Vehicles jam

PPE NON ADHERENCE

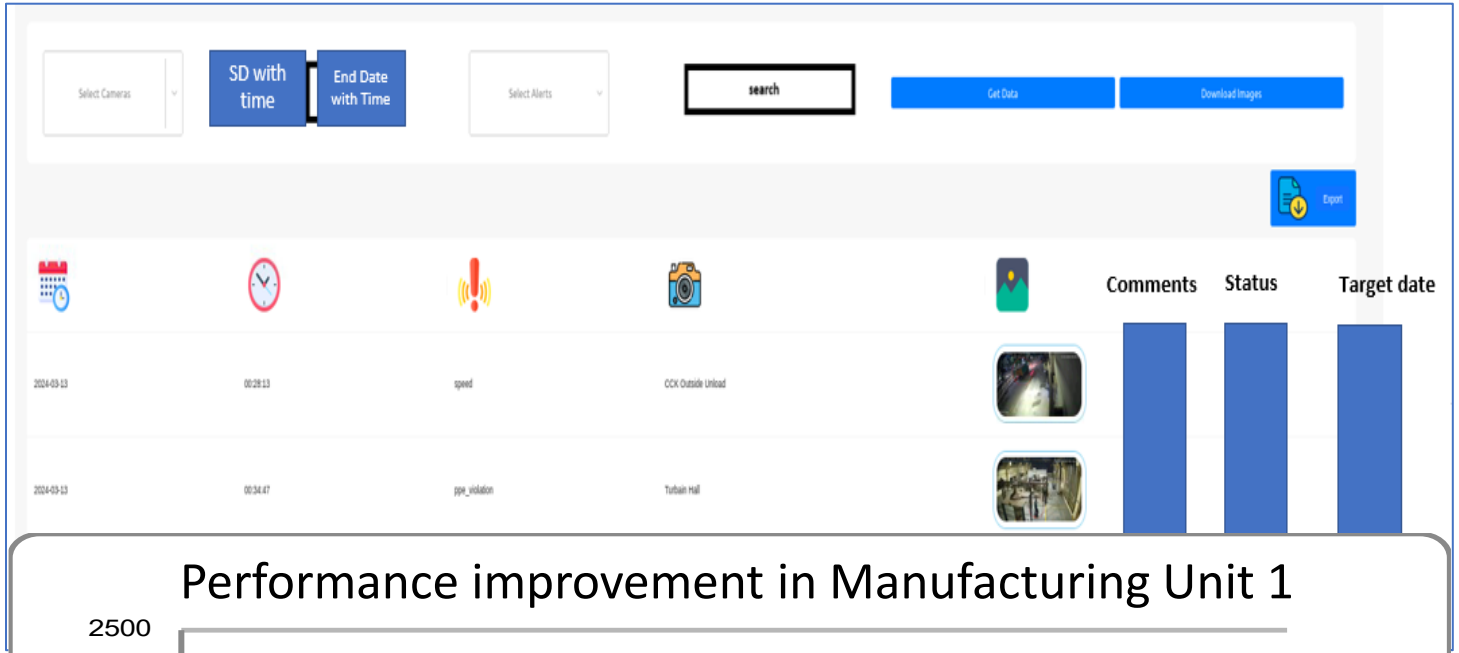
1. Safety Helmet
2. Crash helmet
3. Safety harness while working at height and while material loading / unloading on vehicles

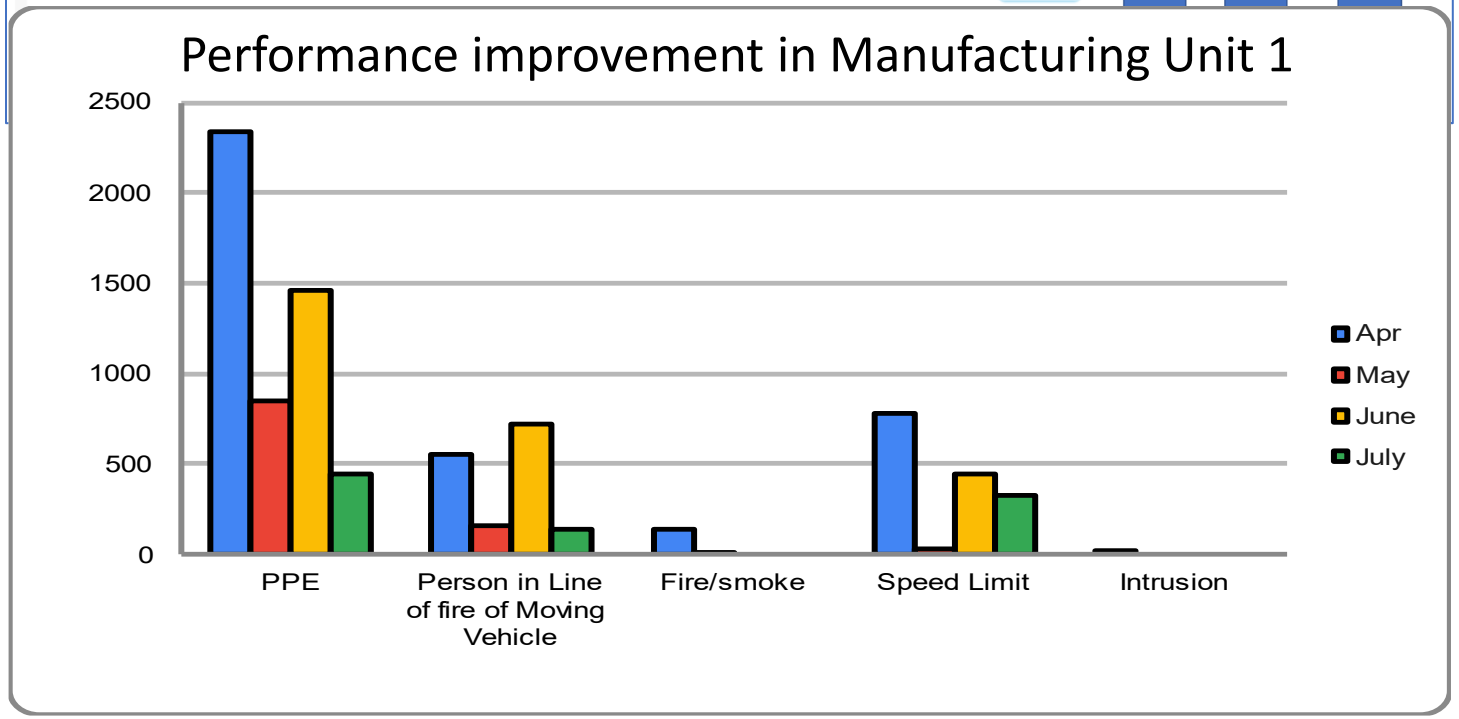
SOP NON ADHERENCE

1. Inspection time/duration/frequency monitoring
2. Is MHE put away correctly while unused
3. Camera tampering

3 Video analytics for safety Monitoring

3 Video analytics for safety Monitoring





Implementation started in FY 23

Gone live in one manufacturing unit

Implementation in Progress in 2 more manufacturing units

Technology Partner supported intervention

- Baseline with incidents reported in the dashboards in progress
- Impact monitoring in progress

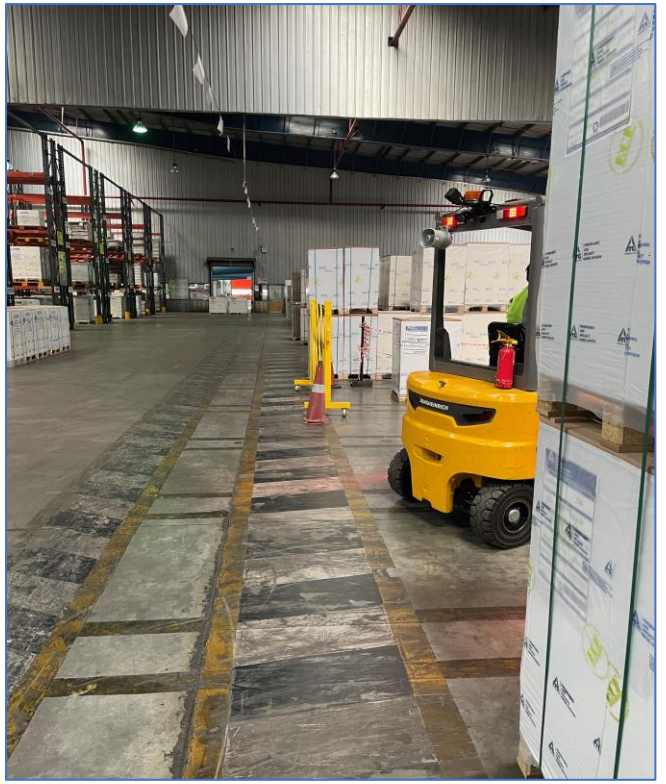
4 Digital in forklift operations safety

Material Handling through forklifts across Finished goods Godowns:

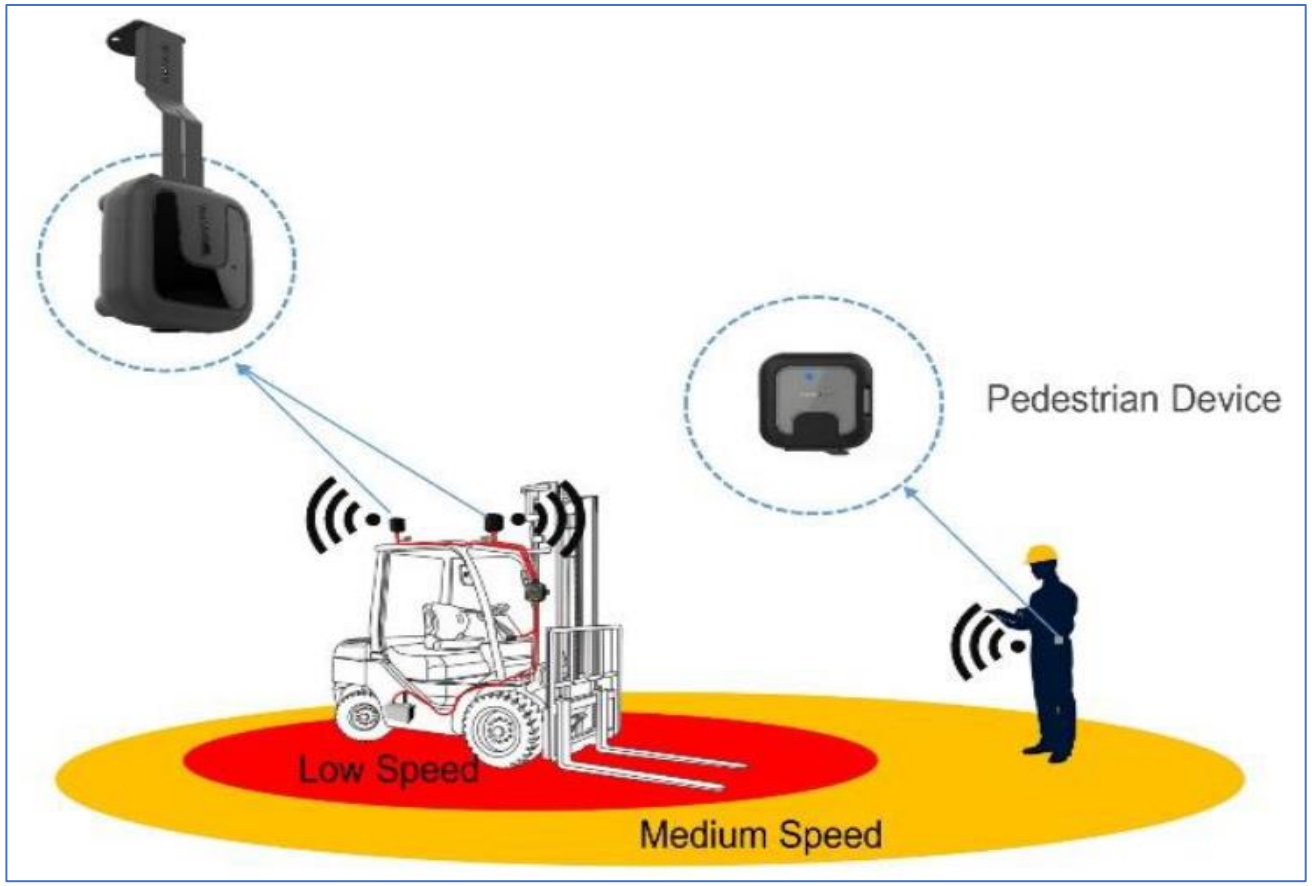
High Risk involved in man-material movements (safety risks, accidents in the past)

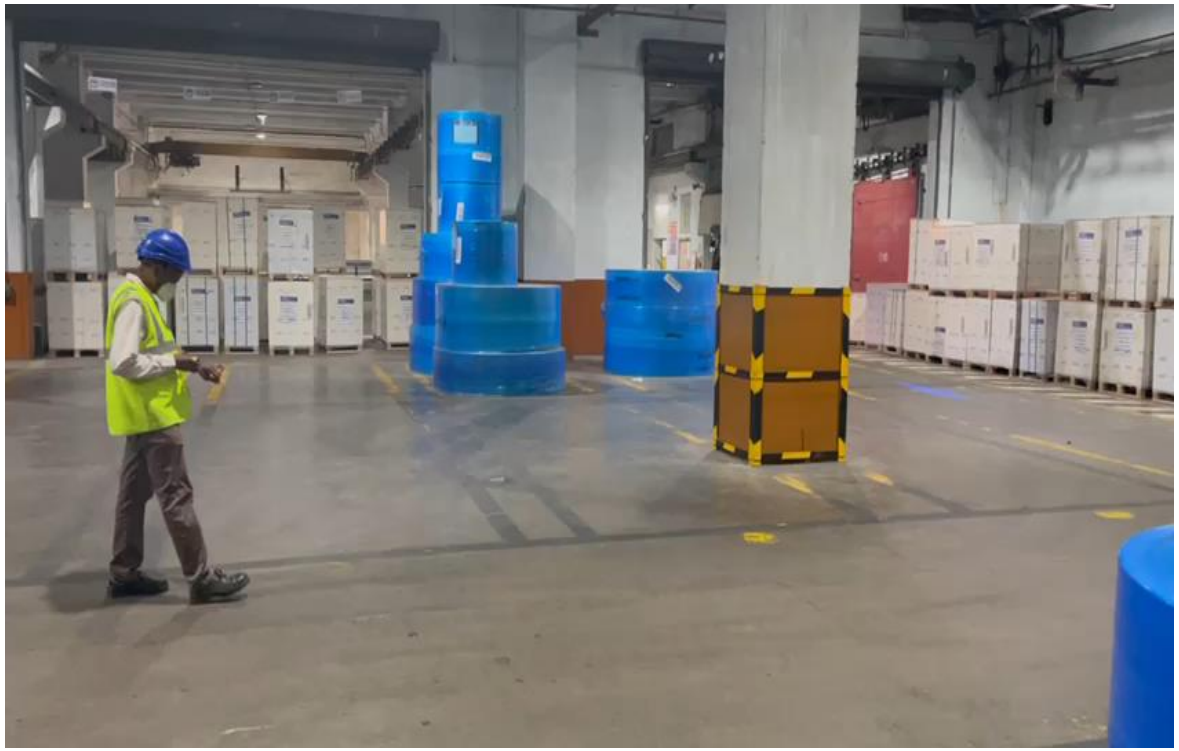
Limited visibility while operating high stacks

Blind Spots while operating forklifts



4A IoT based Solutions for forklift operations safety





In use since FY 23

Installed in 10% of MHE

IoT devices + RFID readers

Technology Partner supported intervention

- 20% reduction in incident reporting
- Scale up % less due to low battery life of IoT devices

4B Computer Vision based Solutions for forklift operations safety

360 degree Coverage

Multiple cam display

Region of Interest

In use since FY 23

Installed in 50% of MHE

Multiple cameras for 360 degree coverage

Technology Partner supported intervention

- 20% reduction in incident reporting
- Alarms historization & Dashboarding in progress

5 Digitization of EHS Management

Search for inspection date manually

Visit site and record findings

Update observations manually

Tracking & follow up manually

Manual to Digital App

- Hazard and Suggestions Reporting
- Action Tracking System
- Inspection Tool & Equipment tracker
- Compliance Calendar
- Safety Risk Assessment
- Training Tracker
- Incident Management
- Permit To Work (PTW)

5 Digitization of EHS Management

Phase 1

Hazard and suggestion reporting	Action tracking system	Inspection tool	Equipment tracker	Doc Manager

Phase 2

Risk assessment	Training tracker & Training Calender	Compliance calendar

Phase3

Work Permit system	Incident & Measurement	Industrial hygiene	Forms/ Audits

Phase 1 & Phase 2 Implementation completed across all the Units

Phase 3 implementation in Progress

Reporting compliance improved by 40%

Audit findings reduced by 10%

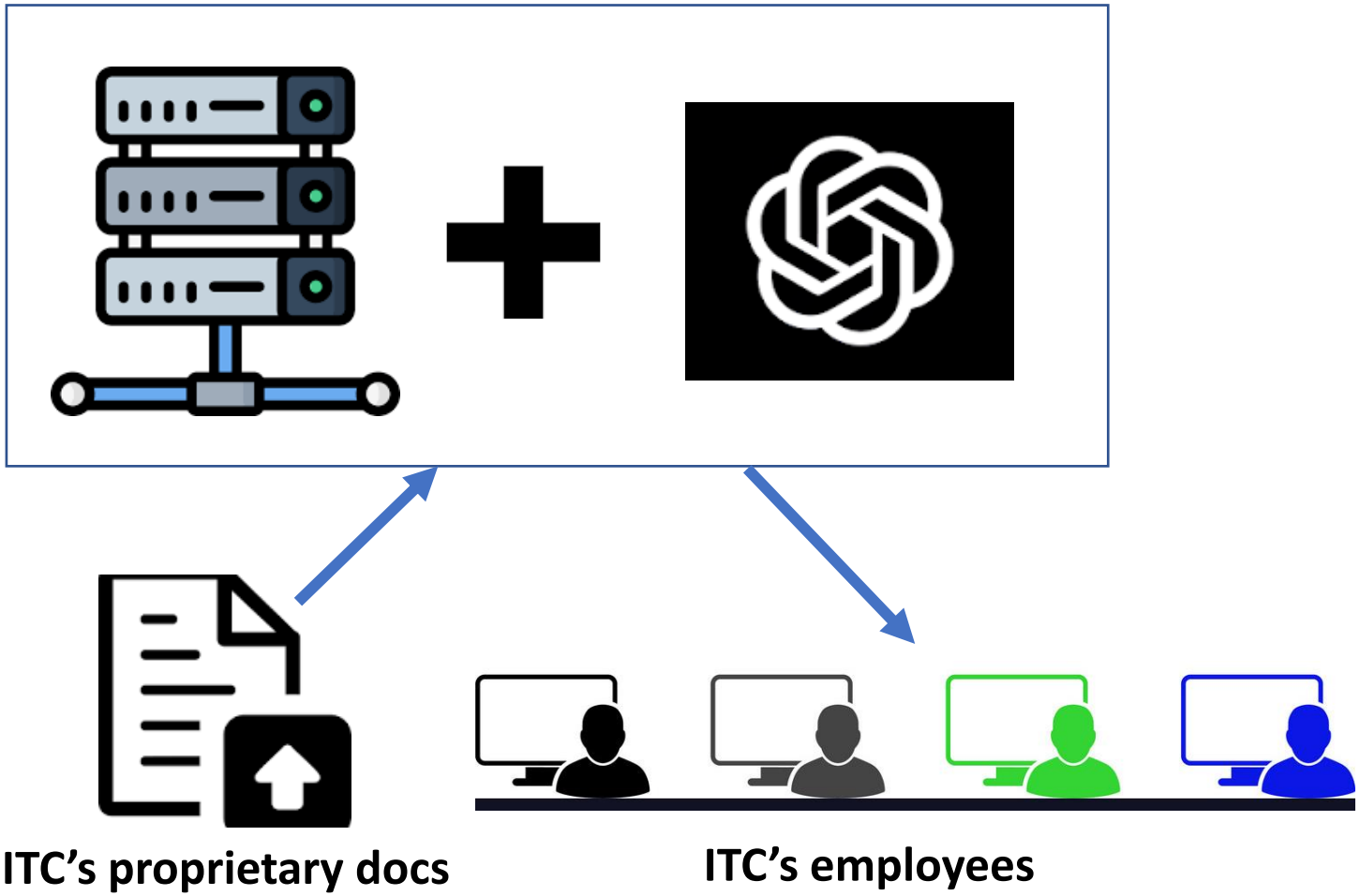
Enterprise role out in FY22

Across multiple businesses of ITC

6 Generative AI for EHS document processing

Gen AI based bot on EHS guidelines to enable quick reference to standards and help employees make better decisions and improve compliance

Enterprise GPT for ITC



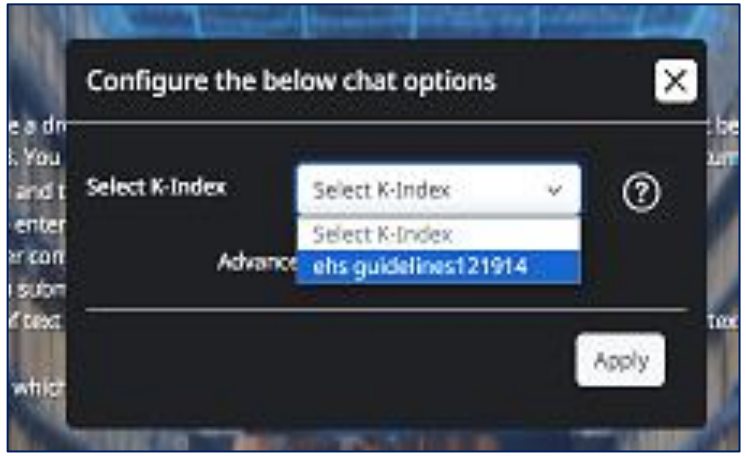
S.No	Title of the Document	No. of Pages
1	EHS standards Section 1	137
2	EHS standards Section 2	60
3	EHS standards Section 3	93
4	EHS standards Section 4	60
5	EHS standards Section 5	45
6	CCTV Guidelines	42
7	Lift safety	2
8	Electric vehicle safety	3
9	Machine Safety	82
10	Fire safety	127
11	Electrical Standards	315
		966

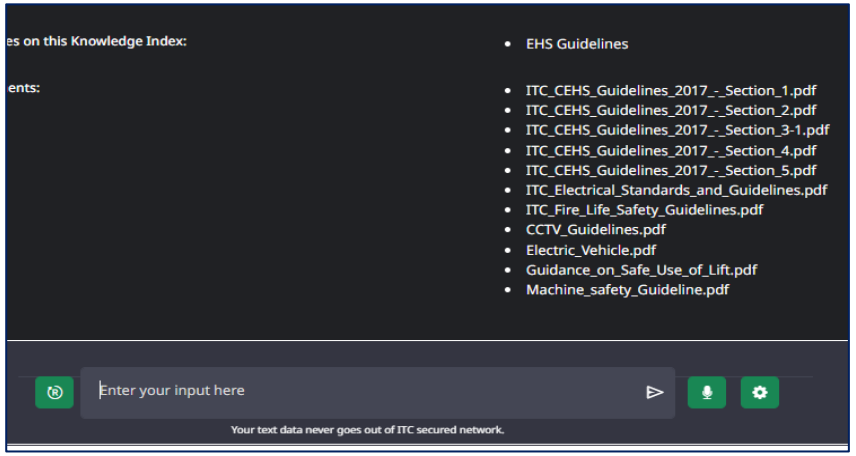
Bot access > 100 employees

Solution rolled out in FY24

6 Generative AI for EHS document processing

User interface for illustration





Please provide the standards with respect to euqipment gaurding?

According to the sources provided, there are several regulations and standards related to equipment guarding. The Indian Factory Act 1948 has several sections related to fencing of machinery, work on or near machinery in motion, employment of young persons on dangerous machines, striking gear and devices for cutting off power, self-acting machines, and casing of new machinery [p45-s0 ; Machine_safety_Guideline_pdf ;0.92] . The Mechanical Engineering Department (MED) of the Bureau of Indian Standards (BIS) has adopted various ISO standards related to machine safety as Indian Standards, including safety of machinery fire prevention and fire protection, hygiene requirements for the design of machinery, permanent means of access to machinery, safety-related parts of control systems, and more [p45-s0 ; Machine_safety_Guideline_pdf ;0.92] . Additionally, interlocks provided for safeguarding must conform to international standards such as IEC 62061:2005 and ISO 14119:2013, and it is advised to procure such safety interlocks from reputed CE certified manufacturers such as Schmersal, Euchner, Siemens, Rockwell, etc. [p71-s0 ; ITC_CEHS_Guidelines_2017_-_Section_3-1_pdf ;0.92] .

[p45-s0 ; Machine_safety_Guideline_pdf ;0.92] What are the specific requirements for fencing of machinery according to the Indian Factory Act 1948?

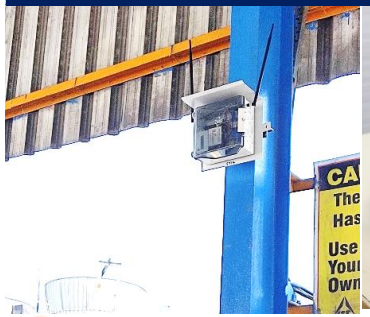
[p71-s0 ; ITC_CEHS_Guidelines_2017_-_Section_3-1_pdf ;0.92] What are the basic safety requirements for machines supplied by European manufacturers as specified in EC directives?

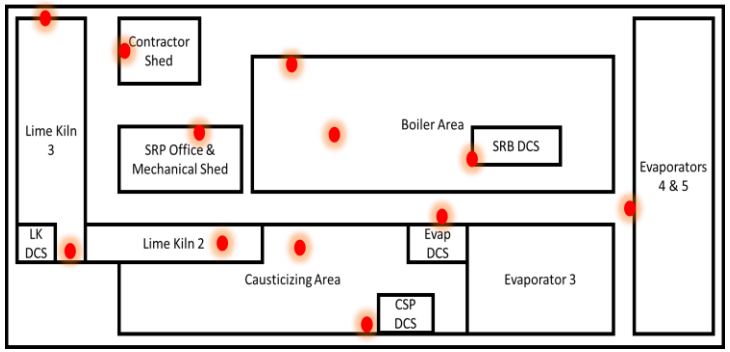
GPT can make mistakes.Consider checking important informaton from original sources:

1. [p45-s0 ; Machine_safety_Guideline_pdf ;0.92]

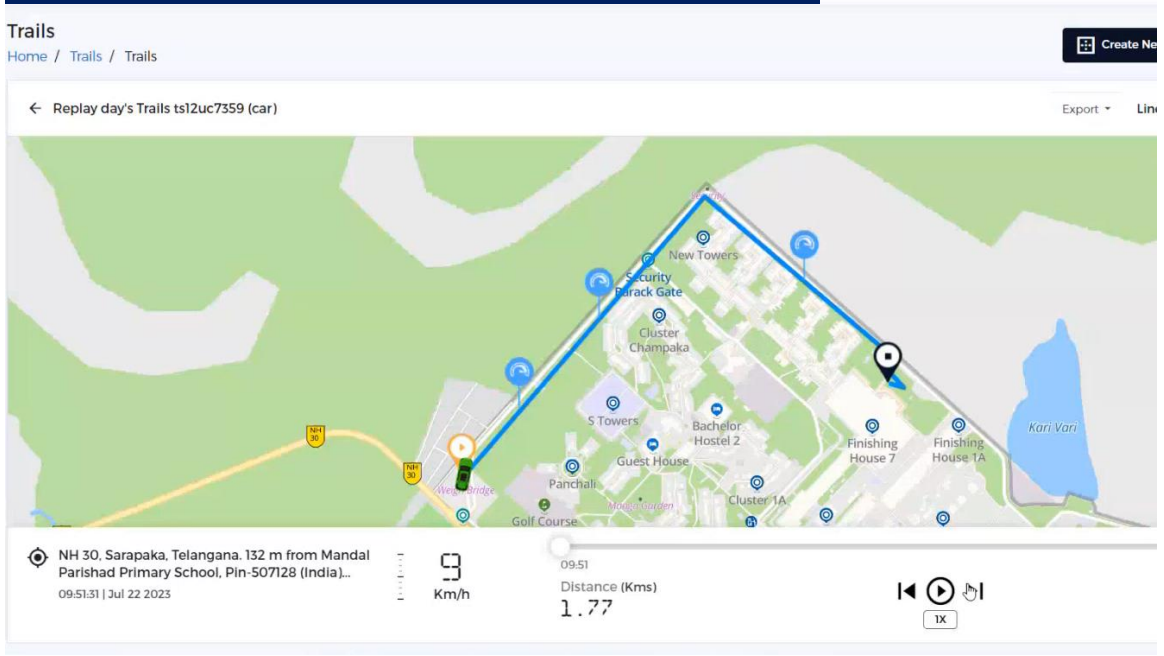
Other Pilots

Connected Worker



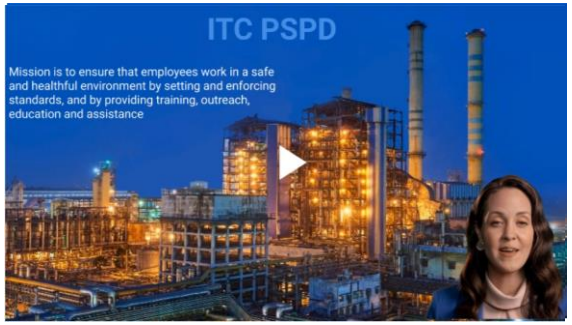


On Premise Traffic Management



Safety Behavior prediction

Text-to-Video Generation through AI

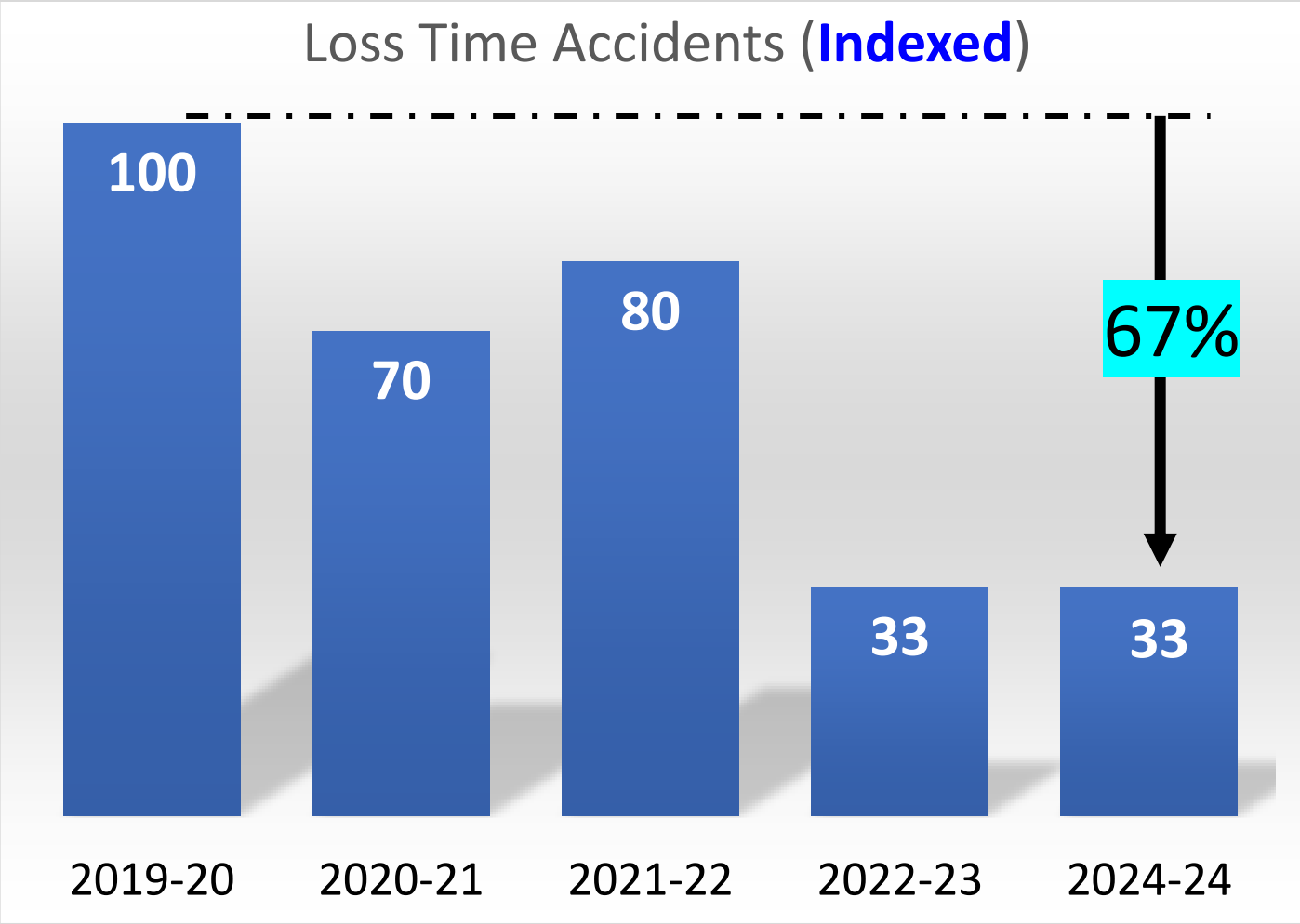


PPE usage

First Aid Incident

Virtual Reality

Impact



Safety Performance improvement achieved through continued efforts in

- Safety Standards adherence
- Audit guidelines adherence
- **Digital & AI interventions**
- Safety Culture Promotion

* Note: The actual LTAs per year are usually less than numerical value 10

Thank You

Journey Continues……