



JARVIS
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You've Been Using CCTV the Wrong Way in Your Plants for 30 Years

Here's What It Was Actually Supposed to Protect

A data-backed playbook for Manufacturing Plant Owners and Heads who are done losing crores to accidents, pilferage, and downtime that their cameras recorded and nobody acted on.



ANPR Detection
at Vehicle Entry



Safety Gear
Detection



Fire & Smoke
Detection



Left Baggage
Detection



Intrusion
Detection

A Note Before You Begin

This is not a vendor pitch. There is no technology agenda hiding behind a statistic. What this is, is a reckoning, for every manufacturing business that has spent decades installing cameras across its plant floor and used them exclusively to watch for thieves.

What your cameras have actually been watching, the near-miss that preceded last month's accident, the material that left through Gate 3 during shift changeover, the machine that gave you 6 hours of warning before it broke down, the PPE violation that happened at 2 AM when the supervisor was on the other side of the floor, none of that has ever been brought to you. Because nobody built the intelligence to read it.

Read this book with a digital highlighter. Share it with your Safety Head, your CFO, your Plant Operations Manager. And then, this week, do something that is long overdue: ask your plant what it already knows.

— The JARVIS Intelligence Team, Staqu Technologies



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We Installed Cameras to
Watch for Thieves, That
Was the First Mistake.



In 1947, the first industrial CCTV system was installed at a German rocket testing facility. The purpose: watch what is happening in a place where a human cannot safely stand. The camera was a remote pair of eyes. Nothing more. The manufacturing industry adopted that same logic, and has never seriously questioned it since.

For thirty years, factory cameras have been designed, installed, budgeted, and evaluated as security devices. They point at gates, stockrooms, loading bays, and high-value stores. Security teams manage them. Insurance companies require them. And every single day, those cameras record something far more valuable than theft and nobody ever asks what it is.

What Your Plant Cameras Were Always Capable Of We Just Never Asked

The hardware was never the problem. A modern plant CCTV camera captures 25 frames per second of high-resolution spatial data, the exact same input that powers computer vision, AI object detection, behavioural analysis, and predictive anomaly detection. What was missing was the intelligence layer on top. That layer now exists. Deploy it on your existing cameras and everything your plant has been passively recording becomes active operational intelligence. No new cameras. No production downtime. Just a smarter question asked of the same device.

What Your Cameras Currently Do

- Record footage in case of incident.
- Store 30 days of footage, then overwrite everything.
- Require human review to extract any insight.
- Answer 1 question: did something happen?
- Used by the security team only
- Reviewed after the loss, never before it.

What JARVIS Adds On Same Cameras Without New Hardware

- Detects anomalies before the incident occurs.
- Generates real-time alerts and permanent audit logs.
- Automatic flagging: no human monitoring required.
- Answers 100 questions: what, where, when, who, why.
- Used by operations, safety, HR, and finance simultaneously.
- Acts before the loss, not after.

The Cost of 30 Years of the Wrong Question

Indian manufacturing loses ₹4.7 lakh crore every year to unplanned downtime alone. Add ₹1,500 crore in annual workplace accident costs, and 3–5% of total raw material input lost to pilferage and unrecorded shrinkage. Every one of these losses happened in front of a camera. What was missing was the intelligence to read it in real time, automatically, before the damage was done.



₹4.7L Cr lost annually to unplanned downtime in Indian manufacturing. (CII 2024)



₹1,500 Cr annual workplace accident cost in India, direct costs only, not productivity loss.



3–5% of total raw material input lost to pilferage and unrecorded shrinkage every year..

2

The Accident Didn't
Happen Suddenly,
It Was Building for 6 Hours
(Nobody Was Watching)



Every major industrial accident investigation reaches the same conclusion: it was not sudden. There were signals. A near-miss two weeks earlier that went unreported. An equipment vibration pattern that changed 3 days before failure. A procedural shortcut that became a habit over 6 months. A hazard zone operating without proper clearance since the last shift change.

The Heinrich Triangle

One of the most cited frameworks in industrial safety. For every 1 major injury in a manufacturing environment, there are 29 minor injuries and 300 near-miss incidents that preceded it. The major accident is not the event. It is the outcome of 300 ignored warnings.

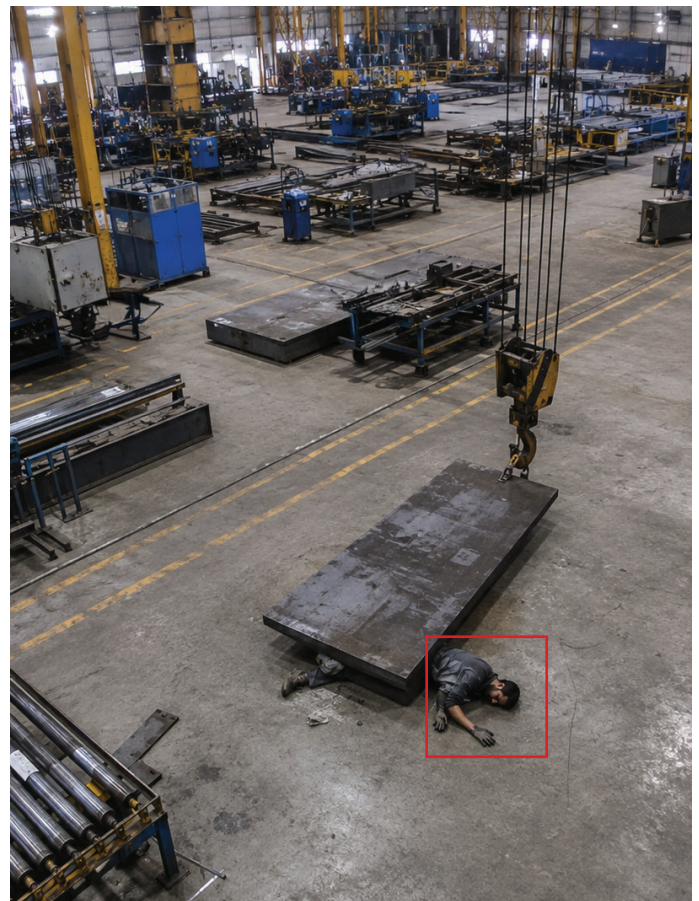
“Your near-miss reporting rate determines which side of the Heinrich Triangle you are managing from. Most Indian plants are managing from the wrong side.”

48 workers die every day in industrial accidents in India, according to the Ministry of Labour 2023 report. The Heinrich Triangle tells us that behind each of those deaths were 29 preventable injuries and 300 near-misses. The near-miss reporting rate in most Indian manufacturing plants is below 10%. Which means the triangle is being built blind.

What Happens in the Hours Before an Accident

Analysis of industrial incidents across heavy industry and auto manufacturing in India shows that in 18% of cases, a detectable warning signal existed less than 30 minutes before the incident. In 24% of cases, the signal was present between 30 minutes and 2 hours before. In 31% of cases, the largest single group, the signal was visible 2 to 6 hours before the event. A further 19% of incidents had signals detectable 6 to 24 hours in advance. And in 8% of cases, the warning signal existed more than 24 hours before the accident occurred.

In other words: in 58% of cases, someone or something watching intelligently could have intervened more than 2 hours before the incident happened. The camera was running. Nobody read it.



What AI Detects Before the Human Eye Does

Smoke / Early Fire:

Traditional: heat sensor triggers post-ignition

JARVIS: visual smoke detection pre-ignition

Lead Time: 8–12 minutes earlier

Worker Collapse:

Traditional: co-worker notice.

JARVIS: AI posture detection.

Lead Time: 2–4 minutes earlier.

Near-Miss Event:

Traditional: manual reporting, less than 10% ever reported.

JARVIS: automatic behavioural log, permanently captured regardless of whether anyone chooses to report it

Unauthorised Zone Entry:

Traditional: guard walkround or post-incident review.

JARVIS: real-time perimeter alert.

Lead Time: immediate, not post-incident

Crowd in Hazard Zone:

Traditional: supervisor observation.

JARVIS: density threshold alert.

Lead Time: 15–20 minutes earlier

Fluid / Chemical leak:

Traditional: operator report or slip incident.

JARVIS: liquid pooling detection.

Lead Time: 30 min – 4 hrs earlier.

Why 90% of Near-Misses Go Unreported and What That Costs

Near-miss reporting is the foundation of industrial safety management. In most Indian manufacturing environments, reporting rates are below 10% of actual events.

- Workers fear blame, disciplinary action, or peer pressure from reporting
- Supervisors fear near-miss reports reflect badly on their zone management
- Manual reporting is time-consuming and easy to skip on a busy shift
- Night shift incidents are systematically underreported, fewer supervisors, lower accountability

The result: your Heinrich Triangle is built on 10% of the data it needs. You are managing 3 reported near-misses and assuming the plant is 30 times safer than it actually is.



JARVIS IN ACTION

At a heavy engineering plant in Pune, JARVIS detected 47 near-miss events in the first 30 days, against a self-reported count of 3 for the same period. Each was logged, classified by zone, and used to identify the 2 highest-risk areas. Targeted interventions reduced incident frequency by 63% in the following quarter. The 44 invisible events were not the result of dishonesty. They were the result of a reporting system built on human incentive rather than automated capture.



Nobody Wears the
Helmet When You're Not
Watching, Now You're
Always Watching.



Every manufacturing plant in India has a PPE policy. Most have posters. Some have mandatory training. A few have fines for violations. And in every single one of them, PPE compliance drops the moment the supervisor leaves the zone.

“ 73% compliance when the supervisor is present. 41% when they are not. Same zone. Same workers. Same shift. The only variable is whether someone is watching. ”

That 32-point gap is not a culture problem. It is a visibility problem. AI video analytics closes it permanently, not by adding supervisors, but by making every camera a compliance monitor that never blinks, never takes a break, and cannot be argued with.

The Real Cost of Non-Compliance: In Rupees, Not Just Risk

In a plant of 500 workers, helmet violations in impact zones run between 140 and 180 per month. If even one of those violations leads to an injury, the cost medical, legal, and downtime combined ranges from ₹8 lakh to ₹25 lakh. Safety harness violations at height carry an incident cost of ₹15 to ₹60 lakh. Glove non-compliance in chemical zones costs ₹4 to ₹12 lakh per incident. Goggles in welding areas: ₹3 to ₹8 lakh. An unauthorized entry into a hazard zone, the violation that causes the most severe outcomes, carries a major incident cost of ₹20 to ₹80 lakh, and occurs 30 to 50 times a month in the average mid-size plant.

These are not hypothetical numbers. They are actuals from incident cost audits across Indian manufacturing. Every one of those violations happened in front of a camera. Almost none were caught in real time.

How JARVIS PPE Compliance Works: Step by Step

Zone Setup: Each zone mapped with required PPE type. One-time, included in deployment

Real-Time Detection: Worker enters zone without required PPE. Camera detects in under 2 seconds.

Alert: Supervisor notified with zone, camera ID, and timestamp in under 5 seconds.

Log: Violation permanently recorded. Non-editable audit trail. Automatic.

Weekly Report: Violations by zone, shift, and time of day. Delivered every Monday. Automatic.

Threshold Alert: Zones exceeding 15 violations per week flagged for targeted intervention, automatically.

Compliance After JARVIS: What the Data Shows

In week zero, before deployment an average PPE compliance in heavy industry and auto manufacturing plants sits at 41%. By week 2, it rises to 54%. By week 4, 67%. By week 8, 79%. By week 12, 88%. From week 16 onwards, compliance stabilises at 93% and above.

Compliance improves not because of more enforcement. It improves because the environment communicates, continuously, that it is observed. The observer effect. JARVIS makes it permanent across every shift, every zone, every hour.

The 3 PPE Insights That Surprise Every Plant Head

INSIGHT 1: SHIFT MATTERS MORE THAN ZONE:

Night shift PPE violations run 2.3x higher than day shift in the same zones. Not because night shift workers are less disciplined, because the perception of being observed is lower. JARVIS makes every shift equally observed.

INSIGHT 2: EXPERIENCED WORKERS VIOLATE MORE THAN NEW JOINERS:

The highest PPE violation rates come from workers with 2–5 years of experience, not new joiners. Familiarity breeds complacency. JARVIS data surfaces this pattern in 8 of 10 plants within the first 30 days.

INSIGHT 3: ZONE DESIGN CAUSES MORE VIOLATIONS THAN ATTITUDE:

In 6 of 10 plants, the highest-violation zones are ones where PPE storage is more than 30 metres from zone entry. Moving the storage point reduces violations by 34% before any enforcement change is made.

4

The Theft That Never
Filed an FIR And the
₹Crore That Quietly Left
Your Plant.



Manufacturing pilferage in India does not look like a heist. It looks like a vendor truck loaded with 98 units but invoiced for 100. A scrap yard weighs consistently 4% lower than the material sent. A stockroom that loses 2–3% of inventory every quarter to causes logged as miscellaneous variance. None of these file FIRs. All of them appear quietly, consistently in the P&L.

The Full Anatomy of Manufacturing Pilferage

Finished goods theft workers or contractors exiting with product accounts for 22% of total manufacturing pilferage. Raw material short-delivery, where vendors invoice for more than they deliver, accounts for 19%. Scrap manipulation at the dispatch bay accounts for 17%. Tool and equipment removal by workers accounts for 14%. Internal pilferage at shift-end — small repeated removals that aggregate over time, accounts for 18%. And contractor collusion, where external parties remove material during active shifts, accounts for 10%.

Of all of these, only finished goods theft and contractor collusion are even partially detectable by a standard CCTV system and only after the event, never before.

The Numbers Most Plant CFOs Don't See

3–5% of total raw material input is lost to pilferage per year in Indian heavy industry.

₹18–45L average annual pilferage loss in a plant of 500 to 1,000 workers.

< 8% of manufacturing pilferage results in an FIR. The rest is absorbed as variance.

When Pilferage Peaks The Shift Reality

Day shift pilferage is the baseline. Evening shift runs 34% higher. Night shift runs 87% higher than the day shift average. And shift changeover, the window between outgoing and incoming teams, runs 141% higher than the day shift baseline. This is the single highest-risk window in any manufacturing plant's daily cycle. Accountability is at its lowest, supervisor attention is split between two teams, and authorised zone movement is at its peak, providing ideal cover for material removal. JARVIS monitors shift changeover as a dedicated high-alert window, automatically, on every shift, without needing to assign additional personnel.



JARVIS IN ACTION

At a steel components manufacturer in Rajasthan, JARVIS delivery analytics flagged a recurring gap between camera-recorded unloading volumes and system-logged receipt quantities. Over 4 months: ₹34 lakh in material invoiced but not delivered. Detected entirely by automated camera-vs-system comparison. No human was assigned to watch the footage.

5

Your Machine Didn't
Break Down.
It Told You It Would (You
Just Weren't Listening)



Tuesday night. 11:14 PM. Third shift. A hydraulic press on Line 2 has been running for 6 hours. The operator has noticed nothing unusual. The shift supervisor is on the other side of the floor. The camera above the press has been watching a vapour pattern build around the hydraulic seal for the last 38 minutes.

At 11:14 PM, JARVIS flags it. Maintenance is called. The seal is replaced by 12:42 AM. Estimated cost of the unplanned failure: ₹17.2 lakh. Actual cost of the planned intervention: ₹47,000. Difference: ₹16.7 lakh. The camera had been watching that press for 3 years. Nobody had asked what it saw.

The Downtime Math: What Your Peers Are Absorbing Every Month

A Tier 1 auto component plant absorbs between 14 and 22 hours of unplanned downtime per month, at a cost of ₹12 to ₹18 lakh per hour a monthly downtime cost of ₹1.7 to ₹4.0 crore. A heavy engineering plant absorbs 18 to 30 hours at ₹8 to ₹14 lakh per hour: ₹1.4 to ₹4.2 crore monthly. Steel and metals processing plants absorb 22 to 35 hours at ₹15 to ₹25 lakh per hour: ₹3.3 to ₹8.75 crore per month. And an OEM auto assembly plant absorbs 8 to 14 hours at ₹25 to ₹40 lakh per hour: ₹2.0 to ₹5.6 crore monthly.

These are not worst-case numbers. They are operational averages drawn from cost audits across Indian manufacturing. The 'unplanned' part of 'unplanned downtime' is the expensive part and it is also the preventable part.

What Equipment Looks Like Before It Fails

95% of equipment failures produce a detectable signal before they happen. In 34% of cases, that signal exists more than 24 hours before the failure. In 28% of cases, the signal is visible 6 to 24 hours before. In 22% of cases, 1 to 6 hours before. In 11% of cases, less than 1 hour before. And only 5% of failures are truly sudden, with no prior detectable signal.

In 62% of cases, the warning signal exists more than 6 hours in advance. The plant that catches the signal avoids the downtime. The plant that misses it pays the full unplanned cost, plus 3 times more in emergency repair costs than the same job would have cost as planned maintenance.

What JARVIS Monitors for Equipment Early Warning



JARVIS IN ACTION

Chennai auto parts plant. 11:14 PM. JARVIS flagged vapour near a hydraulic press. Seal replaced in 47 minutes. Line back online by 12:42 AM. Unplanned failure cost avoided: ₹16.7 lakh. Cost of planned intervention: ₹47,000.

3× the cost of unplanned vs. planned maintenance for the same repair. (Deloitte India 2024)

23% average reduction in unplanned downtime events after AI video analytics deployment.

62% of equipment failures have a detectable visual signal 6+ hours before the breakdown.

YOUR MOVE THIS WEEK:

Identify your 3 highest-downtime machines from the last 12 months. For each: was there a maintenance visit, near-miss, or operator complaint in the 48 hours before breakdown? If yes, that was the signal.

6

47 Cameras, One Plant,
Zero Intelligence.
Here's How to Fix That.



TOTAL CAMERAS : 47

- ✗ THEFT PREVENTION
- ✗ SAFETY MONITORING
- ✗ ASSET TRACKING
- ✗ OPERATIONAL INSIGHTS
- ✗ PREDICTIVE ALERTS
- ✗ DOWNTIME PREVENTION

The average mid-size Indian manufacturing plant has between 40 and 80 CCTV cameras. They cover gates, production lines, material stores, packaging, loading bays, and corridors. They record 24 hours a day, 365 days a year.

And in most plants, the footage is reviewed only when something has already gone wrong.

"Less than 5% of total CCTV footage recorded in Indian manufacturing plants is ever proactively reviewed. The rest overwrites in 30 days, erasing every near-miss, every warning signal, every pilferage event your plant generated that month."

This chapter is about turning 40–80 passive cameras into one unified plant intelligence system. Without replacing a single one of them.

The Full JARVIS Plant Intelligence Architecture

- **Perimeter:** Covers gates, entry and exit points, loading bays, contractor access. Outputs unauthorised entry alerts, vehicle logs, and delivery discrepancy reports
- **Production floor:** Covers all active manufacturing and assembly zones. Outputs PPE compliance alerts, near-miss detection, equipment anomaly flags, and cycle time monitoring
- **Material:** Covers raw material stores, WIP zones, and finished goods dispatch. Outputs movement logs, unusual access alerts, and inventory variance flags
- **Safety:** Covers hazard zones, height work areas, and chemical handling zones. Outputs real-time violation alerts, near-miss logs, and Heinrich Triangle tracking per zone
- **People:** Covers all workforce movement across every zone and every shift. Outputs zone occupancy data, shift pattern analysis, and contractor movement tracking
- **Command dashboard:** Single-screen plant overview, live and historical. Outputs live alerts, daily reports, weekly trends, monthly risk analysis, and auto-generated management reports.



The 12–Month Performance Benchmarks

Across JARVIS manufacturing deployments, the 12-month performance data is consistent. Unplanned downtime drops from 18–24 hours per month to 10–14 hours a 38% reduction. Safety incidents per quarter fall from 6–9 to 2–3, a 67% reduction. PPE compliance rises from 41–56% to 88–93% a 37 percentage point improvement. Pilferage loss as a percentage of input material drops from 3.2–4.8% to 1.1–1.8% a 63% reduction. Near-miss capture rate rises from less than 10% self-reported to over 94% auto-captured. And time to detect a live incident in progress drops from 4–18 minutes to under 30 seconds, a 98% improvement.



JARVIS IN ACTION

JARVIS is currently deployed across Royal Enfield, Tata Group supply chain partners, and Tier 1 and Tier 2 auto component manufacturers in Pune, Chennai, and NCR. In every deployment, the 30-day baseline report identifies between 4 and 9 high-priority operational issues that plant management was unaware of, not because they were not present, but because no system existed to surface them.

7

47 Cameras, One Plant,
Zero Intelligence.
Here's How to Fix That.



Everything in this book has been, until this chapter, a diagnosis. The wrong question asked of cameras for 30 years. The accident that was building for 6 hours. The PPE compliance number that looks right until the supervisor leaves the zone. The material that never filed an FIR. The machine that gave 6 hours of warning before it failed. The 47 cameras recorded everything and produced nothing.

This chapter is the prescription. A precise, sequenced, documented account of what a real manufacturing organisation did, phase by phase, number by number, when they finally decided to ask their cameras what they knew.

Phase 1: The 30-Day Truth Audit (Days 1–30)

JARVIS was deployed. The brief was non-interventionist: do not change anything. Do not brief the workers. Do not act on the data yet. Simply collect, process, and map. Let the cameras tell you what 30 days of uninterrupted operational reality actually looks like.

What JARVIS found vs. what plant management believed This will be written in small fonts, inside a box

- PPE compliance: JARVIS found 43% actual compliance. Management believed 'around 80%', based on supervisor reports
- Near-miss events: JARVIS captured 61 events in 30 days. Management had 4 reported for the same period
- Highest-risk zone: JARVIS identified the press shop, night shift, 10 PM to 2 AM. Management assumed the chemical bay, based on historical FIRs
- Pilferage signal: JARVIS detected consistent material movement at Gate 3 during shift changeover. Management had no specific intelligence on this
- Equipment pre-failure: JARVIS flagged 3 machines showing camera-detectable anomalies before breakdown. Management described all three breakdowns as 'without warning'

The gap between what was actually happening and what management believed was happening, that gap is what JARVIS closes in 30 days. In every plant. Every time.

Phase 2: Three Interventions, Zero Capital Expenditure (Days 31–90)

- PPE enforcement: JARVIS real-time alerts activated for press shop and chemical bay. Supervisors notified within 5 seconds of each violation. Investment: ₹0. Result: compliance rose from 43% to 79% in 8 weeks
- Gate 3 material control: Enhanced monitoring at Gate 3 during shift changeover. Vehicle load tracking activated. Investment: ₹0. Result: pilferage signals at Gate 3 dropped 84%

- Predictive maintenance: 3 flagged machines put on enhanced JARVIS monitoring. Maintenance team briefed and scheduled proactively. Investment: ₹0. Result: zero unplanned stoppages on those 3 machines in 60 days, against an average of 2 stoppages per machine per month previously

The 12–Month Financial Picture

71% reduction in safety incidents, from 7–9 per quarter to 2 per quarter.

₹2.3 Cr total value recovered in 12 months across downtime, pilferage, and incident costs.

Month 5 full ROI recovery on the JARVIS investment. Every month after is net operational gain.

The plant that cut incidents by 71% did not have better workers, newer machines, or more supervisors than yours. It had better intelligence. And it acted on what the intelligence showed it.

8

What the Playbook Means for Your Plant



What the Playbook Means for Your Plant

The reason this playbook works is not that it involves unusually sophisticated technology or unusually capable management. It works because it removes the guesswork that has always sat between plant leadership and operational truth.

The 23% OPEX reduction, the 71% incident reduction, the ₹2.3 crore recovery, none of this was hidden in a strategy document. It was hidden in cameras that had been running in that plant for years, recording the operational reality that shift reports were too imprecise and sometimes too politically motivated, to reflect accurately.

The sequence is always the same: 30 days of truth, targeted interventions with zero capex, then scale and sustain. Every manufacturing plant has its own version of the PPE compliance gap, the pilferage vector, and the machine that was trying to tell someone it was about to fail.

Ask the cameras what they know. Act on what they tell you. Measure the result. Repeat.

Get In Touch

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