

TECHCIRCLE **kyndryl**

Bridging the IT–OT Divide

Building the Digital
Core of Modern
Manufacturing



Table of Contents

01	Executive Overview: From Connected Plants to Intelligent Production	03
02	The Manufacturing Crossroads: Why IT–OT Convergence Can’t Wait	05
03	The Heart of the Factory: Understanding Processes Before Digitizing Them	06
04	The IT–OT Convergence Blueprint: From Data Islands to an Integrated Core	07
05	Leading Through Change: The Human and Organizational Factor	09
06	CIO Speak: Owning the IT–OT Convergence Agenda	10
07	The Kyndryl Advantage: Turning Convergence into Measurable Outcomes	12
08	The Road Ahead: Turning Vision into Execution	14

Executive Overview:

From Connected Plants to Intelligent Production

Manufacturing in India stands at a pivotal juncture. While 92% of global manufacturers recognize that smart-factory initiatives will drive competitiveness in the coming years, many Indian factories still rely on outdated systems, such as paper logbooks and siloed control systems. This disconnect between Information Technology (IT) and Operational Technology (OT) is a significant risk. With manufacturing contributing approximately 16–17% to India's GDP and employing tens of millions, any lapse in real-time integration threatens not just productivity, but the country's export competitiveness and job creation ambitions. With supply-chains shifting globally, Indian factories that fail to build a real-time, integrated digital core risk being bypassed by faster, smarter peers..

Key Areas for Transformation

Unified Data Foundation

Integrating shop-floor data (e.g., PLC/SCADA, quality logs, maintenance records) with ERP/MES into a single contextual model creates a **"single source of truth."** This integration enables analytics across plants, revealing root causes and enabling consistent decisions enterprise-wide. For instance, one study notes that 35% of MES data was purged each month in some plants, losing critical insights on production issues.

Edge–Cloud Hybrid

Balancing immediacy and scale, on-premise edge devices handle millisecond-critical analytics and automated control, while the cloud aggregates information for cross-plant learning and heavy simulation. This tiered approach conserves bandwidth by sending only summaries or exceptions upstream. Notably, 87% of companies deploying private wireless and edge report ROI within a year.

Secure by Design

Applying zero-trust principles and strict segmentation to both OT and IT is essential. Every device and user must authenticate, and critical control networks should be segmented using firewalls or data diodes.

A joint IT–OT Security Operations Center is crucial to detect anomalies, such as a controller suddenly contacting the internet at midnight. Manufacturing is often the most targeted sector for cyberattacks, historically seeing nearly 25% of all attacks.

In short, IT–OT convergence is not optional – it's urgent and strategic. The next wave of competitiveness comes from real-time, data-driven operations.

This paper outlines how to collapse data silos, align IT and OT teams, and create measurable outcomes that CEOs and boards will recognize as critical to future growth.

As per a recent TechCircle CIO Pulse Survey, **58% of respondents said they have piloted their IT-OT integration** journey in at least a few plants.

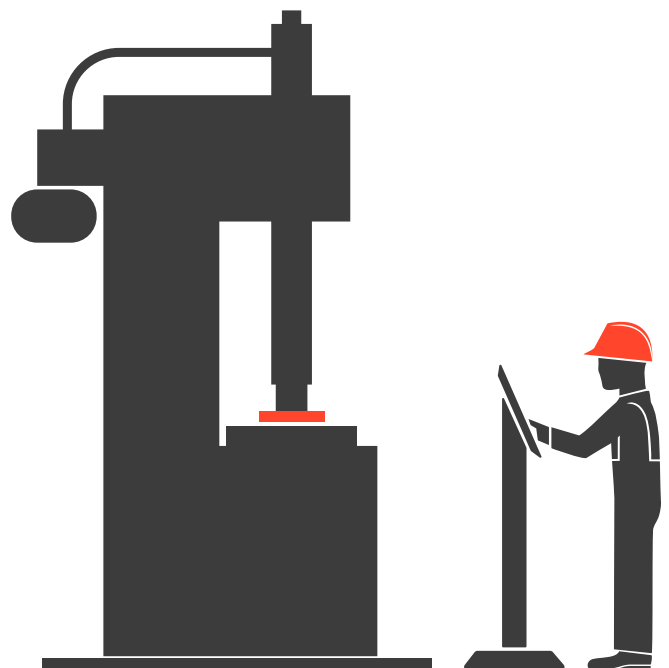
Source: TechCircle Research

AI-Driven Operations

Embedding AI and analytics throughout operations—from edge vision systems that spot defects to reinforcement-learning schedulers that optimize production in real-time—can significantly enhance productivity.

For instance, combining private 5G with on-site compute, 94% of firms reduced their carbon emissions, and 41% cut emissions by over 20% through predictive maintenance and AI-based optimization.

Source: Nokia, GlobalData



The Manufacturing Crossroads: Why IT–OT Convergence Can't Wait

India's factories are often digitized at the office but analog on the floor. A PwC survey revealed that 38% of Indian manufacturers lack a clear roadmap for shop-floor digitization. Most spend over a year stuck in "pilot purgatory," time in which competitors innovate. In India's fiercely competitive market this delay is dangerous.

Fragmented Systems

Many legacy machines fail to integrate seamlessly with modern IoT platforms, resulting in parallel control networks and isolated data silos.

As per a recent TechCircle CIO Pulse Survey, 66% of respondents identified **fragmented, hard-to-maintain integrations as the biggest barrier** to scaling IT-OT PoCs into enterprise-wide deployments.

Source: TechCircle Research

Scaling Obstacles

While companies pilot multiple Industry 4.0 solutions, only about 30% of these pilots scale across the enterprise. Many organizations spend over a year in pilot mode, delaying productivity gains and allowing competitors to innovate and capture market share.

Competitive Pressure

Achieving India's manufacturing ambition of contributing 25% to GDP requires a significant productivity leap. Industry 4.0 and digitization could unlock over \$300 billion in value by 2027. Global studies indicate that manufacturers merging IT and OT report 10–20% higher output and up to 20% better labor productivity.

Conclusion

To remain competitive and achieve the government's manufacturing targets, Indian manufacturers must prioritize the development and execution of comprehensive digital strategies. This includes integrating IT and OT systems, scaling successful pilots, and leveraging Industry 4.0 technologies to enhance productivity and innovation. The time to act is now; every quarter spent without progress is a quarter lost to competitors.

Source: Smart Manufacturing and Operations Survey 2025, Deloitte

The Heart of the Factory:

Understanding Processes Before Digitizing

Digitization without process clarity is just faster failure. Each plant has unique operational DNA: automotive lines demand millisecond precision, food facilities must safeguard hygiene, and chemical plants must manage continuous reactions safely. Effective transformation starts with deep process understanding.

Map and Involve

Engage operators and engineers from Day 1. Use value-stream mapping and PFMEA to uncover bottlenecks, scrap causes, and manual workarounds. Automation should target root causes, not symptoms.

Test Before Control

Begin with open-loop simulations. Validate setpoints manually, refine the model, then implement closed-loop control (e.g., MPC). Adaptive algorithms ensure continuous recalibration as conditions shift, minimizing surprises and maximizing output stability.

Process-Accurate Digital Twins

Build models that reflect real physics and control logic. Customize for plant-specific needs—simulate heat, reaction kinetics, or robot timing. High-fidelity twins enable optimization and “what-if” testing without touching hardware. Example: incorporating ambient humidity in a twin increased yield by 12%.

Measure Real Gains

Pilot on a line or unit to quantify throughput, scrap, and energy improvements. Demonstrable results—like a 15% cycle-time reduction in aerospace machining—build the business case and support enterprise-scale rollout.

Bottom Line:

Know the factory first, digitize second. Embed lean principles and centerline control in your digital design to ensure that IT-OT integration drives measurable, sustainable outcomes.

The IT–OT Convergence Blueprint: Building an Integrated Operational Core

Building a factory's "operating system" requires a structured architecture. The key components are:

Unified Data Fabric

Merge OT (machines, sensors, QA logs) with IT systems (ERP, MES, CRM) into a single, contextual layer. Every data point carries machine, batch, operator, and timestamp metadata. Use open protocols (OPC-UA, MQTT) to enable analytics and AI at scale. Start by consolidating historians and control systems—this is the foundation for enterprise-wide insights.

Edge–Cloud Hybrid

Deploy edge nodes for millisecond-critical tasks—fault detection, vision analytics, real-time control—while the cloud handles cross-plant analytics and heavy simulations. Two-tier architecture ensures resilience: plants operate locally even if cloud connectivity drops.

By integrating data from physical assets with enterprise application systems, manufacturers can create a 360° view of operations—where IT and OT no longer operate as separate silos but as a unified digital core across the value chain—improving the production ecosystem and creating measurable value for the organisation and its customers.



Sachin Suryakant Kulkarni
Consult Partner, Kyndryl Consult



Source: Nokia

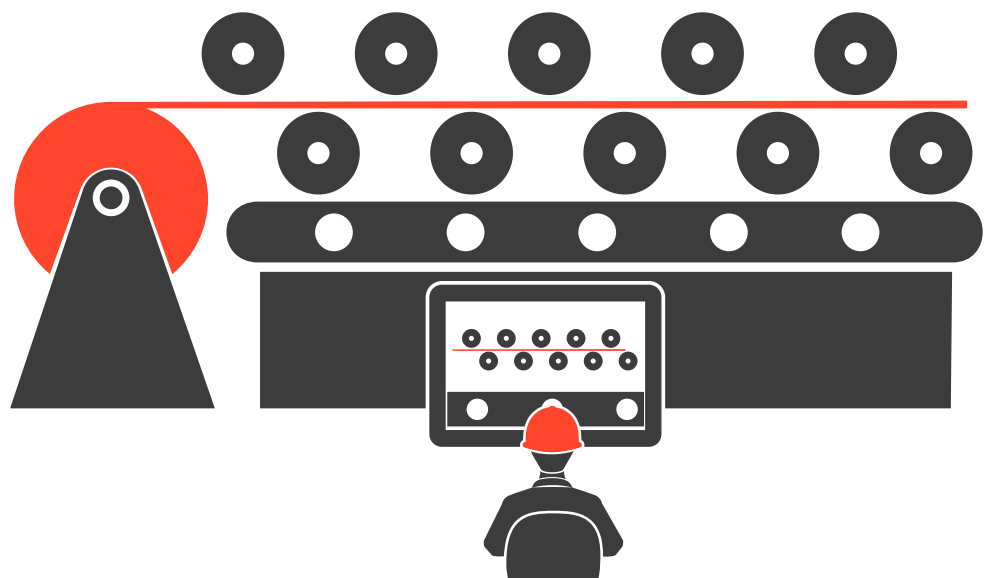
Zero-Trust Security

Apply enterprise-grade security to OT. Every device and user authenticates; critical networks are segmented with firewalls or data diodes. Integrate OT devices into IT monitoring, enabling anomaly detection and reducing blind spots. **Zero-trust safeguards operations and strengthens stakeholder confidence.**

AI at the Edge

Push ML models to shop-floor devices to predict failures, optimize setpoints, and detect defects in real time. Edge analytics reduces upstream data volumes by sending only anomalies or summaries. Operators act proactively; processes continuously learn and improve. 70% of industrial sites now run AI workloads at the edge.

Together, these elements form the factory's integrated operational core. Data flows securely between shop-floor and enterprise; decisions occur at the right level (edge or cloud); and governance (data quality rules, shared KPIs) ensures consistency as the system scales. In practice, managers across plants can see key issues (part shortages, quality dips, energy spikes) in a unified dashboard and respond in minutes rather than days. This isn't just an IT project – it becomes the central nervous system of an intelligent plant.



Leading Through Change: The Human and Organizational Factor

Technology alone won't bridge IT and OT – people will. Traditionally, IT's role is stability and efficiency, while OT focuses on uptime and safety. Convergence demands new mindsets and ways of working. Here are key practices:

Shared Governance

Form a Digital Operations Council co-led by the CIO and COO with plant, IT, OT, and security leaders. Set shared KPIs (OEE, MTTR, first-pass yield) and roll out projects in controlled waves. Over 50% of top manufacturers now run centralized smart factory CoEs to break IT-OT silos.

Outcome-Based Incentives

Link leadership and team rewards to plant KPIs—throughput, quality, energy savings—not technology milestones. Publicly celebrate cross-functional wins to build ownership and accountability.

Visible Leadership

CIOs belong on the shop floor; plant heads in IT reviews. Use 90-day sprint pilots—align goals, connect systems, deliver 1-2 high-value use cases, validate, and scale. Treat failures as iteration, not regression.

Agile Cross-Functional Squads

Deploy small, empowered teams with operators, maintenance, IT/data, OT controls, and cybersecurity experts. Work in 2-week sprints under shared KPIs. This model accelerates delivery and eliminates “us vs. them” culture.

Upskilling and Talent

Pair veteran operators with data/IT talent. **Many plants lack people who speak both “machine” and “data.”** Invest in training and easy-to-use tools. For instance, deploy self-service analytics dashboards so engineers can query OT data without waiting on IT. Retain OT depth in-house; source niche AI and cyber skills externally.

Bottom Line:

IT-OT convergence succeeds when culture, capability, and accountability align. A factory where operators, engineers, and technologists speak the same language of data-driven performance is no longer aspirational—it's the new benchmark for competitiveness.

CIO Speak:

Owning the IT–OT Convergence Agenda

For manufacturing CIOs, IT–OT convergence is no longer a pilot—it's the backbone of digital operations. The mandate: unify data, secure infrastructure, and drive measurable performance gains.

Start With a Fact-Based Baseline

Run a rapid IT–OT maturity audit: visibility of OT assets, data capture rates, unplanned downtime cost, and security exposure. Use a 4-pillar lens—Data, Network, Use Cases, Security. Identify quick-win pilots (e.g., a line with recurring micro-stops) to validate ROI and build internal momentum.

Architect a Phased Roadmap

- **Connect & Collect:** Instrument critical assets and consolidate machine data into a common historian.
- **Analyze & Advise:** Apply predictive analytics for downtime, quality, and yield insights.
- **Optimize & Scale:** Automate interventions and expand to additional plants.
- **Anchor each phase to tangible outcomes**—reduce downtime 5–7%, improve OEE 3–5%, cut maintenance cost 10–15%.

Institutionalize Governance

Form a Digital Operations Council (CIO, COO, CISO, Plant Heads) to drive funding, resolve cross-functional friction, and align with enterprise OKRs. Governance must track impact, not activity—every sprint should tie to cost, risk, or throughput KPIs.

Engage the C-suite

Tailor messages to each executive.

- **CEO/Board:** Position IT–OT convergence as a growth and resilience lever. Smart factories deliver 10–20% productivity gains. Competitors are already monetizing data-driven operations. Unified shop-floor visibility reduces cyber-physical risk—manufacturing faces some of the highest global attack rates. Frame convergence as a board-level mandate for growth, cost efficiency, and risk reduction.

- **COO/Operations:** Anchor the conversation in throughput, quality, and safety. IT–OT integration exposes hidden inefficiencies—real-time visibility into micro-stops and process deviations has delivered double-digit productivity gains for peers (Apollo Technical). Reinforce co-ownership: engineers stay central to every change, and automated setpoints always include operator safety controls. Stress how digitization eases labor shortages and improves plant safety through predictive alerts.
- **CISO/Security:** Reframe convergence as risk mitigation, not exposure. Legacy OT systems are the real vulnerability. A unified cyber architecture—segmented networks, OT monitoring, anomaly detection, and joint drills—closes long-standing blind spots. Request budget for OT-aware firewalls and patching automation. Highlight that leading manufacturers now include OT in annual enterprise risk assessments.

Continuous Review

Track a running dashboard—data ingested (% of connected assets), downtime hours saved, OEE uplift, quality delta, and security incidents mitigated. Institutionalize quarterly reviews to fund scale-ups, retire failures, and enforce learnings across sites. With disciplined tracking and executive sponsorship, pilots can evolve into enterprise programs rather than shelf ware.

Lead as an Orchestrator.

IT–OT convergence is not a project—it's a board-level transformation agenda. The CIO's role: connect technology and operations into one operating fabric where every machine, process, and person contributes to data-driven performance.

Source: PwC



The Kyndryl Advantage:

Turning Convergence into Measurable Outcomes

Many convergence efforts stall at pilot stage. An experienced partner can help bridge to scale. Kyndryl brings deep expertise in both legacy industrial controls and modern IT. Our Connected Manufacturing Core framework glues cloud, edge and data fabric onto existing infrastructure – connecting disparate PLCs and older SCADA systems (even from multiple vendors) into one cloud-based data lake, without ripping out everything. With unified data, AI can then analyze production end-to-end.

Our Delivery Model:

Discover → Design → Deploy → Scale

ensures tangible results at each step

Discover

Using **Kyndryl Bridge**, we map your current state (IT/OT assets, networks, security, people) and identify quick wins with your leaders. Perhaps we'll find five different historians in use and consolidate them into one view.

Design

With **Kyndryl Vital**, we co-create the target architecture in collaboration with plant, IT, and OT teams. Our human-centered design approach ensures digital twins, analytics, and automation mirror real-world process dynamics—building a transformation roadmap anchored in measurable ROI.

Deploy

We implement rapidly on a pilot line/plant using agile sprints. Data gateways, edge devices and analytics go in place with minimal downtime. Knowledge transfer happens as we go – we build the client team's expertise. Each sprint adds capabilities (e.g. dashboards first, then AI alerts).

Scale

Expand from pilot to enterprise. We roll out standardized templates to other lines and plants, fine-tune based on feedback, and establish a central dashboard to monitor all sites. The unified core becomes the new factory OS everywhere.

We emphasize **co-creation**: Kyndryl works as one team with you, not just a vendor. If, say, energy efficiency is a priority, we'll focus pilots on power submetering and analytics. We respect plant safety – work in maintenance windows with rollback plans. This collaborative approach turns what looks like an “IT project” into an operations success story.

For manufacturers dependent on supply chains, integrating IT and OT is vital for resilience. At Kyndryl, we consolidate plant-floor systems, logistics platforms, and enterprise IT into a unified digital core. This integration offers real-time visibility, allowing manufacturers to predict disruptions, improve efficiency, and enhance value chains



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Business Case Example

A **leading automotive manufacturer engaged Kyndryl to unify data silos across assembly lines**. By merging production, quality and maintenance data into one platform and deploying edge analytics, they achieved double-digit throughput gains on a key line – consistent with smart factory benchmarks. The system identified and eliminated unnoticed micro-stops and provided predictive alerts for part shortages. Similar cross-industry results – in chemicals, consumer goods and electronics show that with decades of mission-critical experience, **Kyndryl turns isolated pilots into enduring advantage**. We focus relentlessly on measurable outcomes: higher yield, less downtime, lower energy use and safer operations.

Industrial organisations face growing challenges in securing OT, ICS, and IoT environments. At Kyndryl, we help customers build strong security foundations through network segmentation, device hardening, and secure remote access so they can confidently address evolving threats. Our teams design architectures that align with industry frameworks ensuring compliance and resilience. With these essentials in place, manufacturers can unlock advanced OT use cases like digital twins for real-time plant optimisation and AI-driven solutions for truck management, predictive maintenance, safety monitoring, and quality improvement, driving tangible gains in productivity and resilience.



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The Road Ahead:

Turning Vision into Execution

The journey to bridge IT and OT is not about isolated upgrades — it is about re-architecting the manufacturing enterprise for intelligence, agility, and resilience. Throughout this paper, we've explored how a unified digital core transforms factories from siloed operations into adaptive, connected ecosystems.

Clear Value Levers

- Real-time data flows enable faster decision cycles and autonomous responses.
- Networked plants create collective intelligence, amplifying every local improvement across the enterprise.
- Converged systems deliver measurable sustainability gains — lowering emissions, reducing waste, and simplifying compliance.
- Agility at scale allows manufacturers to respond to disruption with speed and precision.

People as the Decisive Factor

Technology alone does not drive transformation - people do.

- A digitally fluent workforce must operate seamlessly across the shop floor and the cloud.
- Accelerated skilling and cross-functional collaboration are critical to translate infrastructure into outcomes.
- A culture of continuous innovation ensures the transformation endures and compounds.

A Pragmatic Roadmap for Leaders

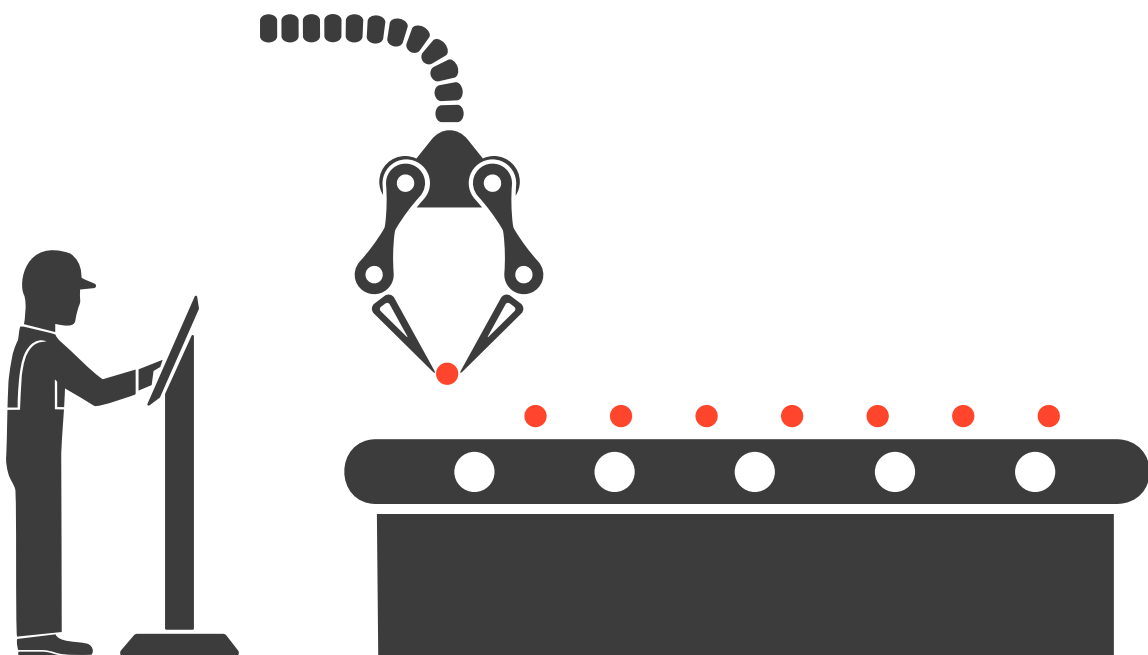
- Think Big: Define a bold transformation vision.
- Start Small: Launch focused, high-impact pilots.
- Scale Fast: Build modular architectures that evolve, not overhaul.
- Measure Relentlessly: Embed metrics into every initiative.
- Learn and Adapt: Treat setbacks as feedback, not failure.

Manufacturers that act decisively today will build intelligent, sustainable, and future-ready operations, shaping India's competitive edge on the global manufacturing stage. The divide is no longer technical, it's strategic. The time to cross it is now.

IT/OT convergence is redefining manufacturing — connecting plant operations with enterprise systems to unlock efficiency, reduce costs, and improve product quality through a phased, data-driven digital roadmap. It's not just about technology integration, but about creating a unified digital core that drives agility and innovation. Manufacturers that embrace this convergence today will set the pace for the intelligent, resilient factories of tomorrow.



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About TechCircle

TechCircle is a trusted Go-to-Market consulting and intelligence platform for technology providers. We enable global and Indian tech suppliers to accelerate growth by combining account-level research, market insights, and exclusive executive engagement platforms.

Through in-depth industry intelligence, account profiling, and tailored engagement formats, we connect technology providers with the right decision-makers across BFSI, manufacturing, healthcare, and other industries.

By bridging enterprise intent with supplier opportunity, TechCircle acts as a growth partner, helping tech providers build meaningful client relationships and convert them into measurable business outcomes.

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