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MICRAFT INTELLIGENCE SERIES — MANUFACTURING OPERATIONS

OEE and Production Efficiency in Indian Manufacturing

Understanding the Measurement Gap and the Path to Operational Excellence — Why manufacturers consistently underestimate production losses and how real-time shop floor systems close the gap

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Executive Summary

Finding 1 — The OEE Measurement Gap Is Larger Than Most Manufacturers Recognise

Manufacturers relying on manually compiled OEE data consistently report figures 8 to 15 percentage points higher than the actual OEE measured when real-time, at-source data capture is implemented. This gap is structural, not intentional.

Finding 2 — Two Loss Categories Account for 60–70% of Improvement Opportunity

Analysis across Micraft MES implementations reveals that unplanned downtime and minor stoppages account for 60 to 70% of total OEE losses in most Indian discrete manufacturing environments. Focused improvement here delivers the majority of achievable uplift.

Finding 3 — Deployment Speed Is the Critical Variable in MES ROI

The difference between an MES delivering measurable improvement within 6 months versus marginal results over 18 months is almost never the feature set. It is whether the system went live quickly enough, with sufficient operator adoption, to generate the measurement accuracy needed for meaningful analysis.

SECTION 1

The State of OEE Measurement in Indian Manufacturing

1.1 The Adoption of OEE as a Manufacturing KPI

OEE has been a standard manufacturing performance metric since its formalisation in the context of Total Productive Maintenance (TPM) methodology in the 1980s. Its adoption in Indian manufacturing has accelerated significantly over the past decade, driven by three factors: the expansion of automotive and engineering export-oriented manufacturing with customer-mandated performance metrics; the growth of Lean Manufacturing implementation programmes; and the increasing availability of affordable production monitoring technology.

Today, OEE is referenced in the performance review of the majority of Indian manufacturers operating at any significant scale. Yet the quality and accuracy of OEE measurement varies enormously — from rigorously measured, machine-level continuous monitoring to weekly estimates compiled from supervisor recollections.

1.2 The Two Versions of OEE in Indian Manufacturing

Reported OEE: The figure presented in the weekly or monthly management review. Calculated from shift reports compiled by supervisors. This is the basis for most benchmarking discussions and improvement target-setting.

Actual OEE: The figure that emerges when machine-level, real-time, at-source data capture is implemented. Consistently lower than Reported OEE — by 8 to 15 percentage points across Micraft MES implementations.

The gap between Reported OEE and Actual OEE is real, systematic, and explained by the structural limitations of manual data collection — not by dishonesty or poor management.

SECTION 2

Understanding OEE — The Formula and Six Loss Categories

OEE = Availability × Performance × Quality

All three components are expressed as percentages. A world-class OEE benchmark of 85% represents approximately 90% availability, 95% performance, and 99.9% quality. Most manufacturers tracking OEE honestly are between 60% and 75%.

Loss Category	OEE Component	Description
Equipment Failures	Availability	Unplanned breakdowns and stoppages
Setup and Adjustments	Availability	Changeover time, startup adjustments
Minor Stoppages / Idling	Performance	Brief interruptions under 10 min — most undercounted
Reduced Speed	Performance	Machine running below theoretical maximum rate
Process Defects	Quality	Defective output during stable production
Reduced Yield / Startup	Quality	Defective output during startup and changeover

Table 1: The Six Big Losses Framework

SECTION 3

The Measurement Gap — Why Manual OEE Understates Losses

3.1 The Minor Stoppage Invisibility Problem

Minor stoppages — brief interruptions under the formal downtime recording threshold — are the category most severely undercounted in manual systems. A 3-minute stoppage is too brief to trigger a formal maintenance call, too disruptive to record carefully, and too forgettable to appear in an end-of-shift summary. Yet ten 3-minute stoppages per shift on a 480-minute line represent a 6.25% availability loss. Across 250 shifts per year, that is approximately 7,500 minutes of lost production with no record.

3.2 The Performance Estimation Problem

Standard output figures are frequently set at initial production standards and never revised when machine condition changes. Actual output counting is subject to rounding. Together these produce performance figures 2 to 5 percentage points higher than reality when compared against continuous, at-source data capture.

3.3 The Rework Invisibility Problem

Units that fail an inline quality check, are reworked, and pass final inspection are counted as good units in end-of-shift reports — because by that point they are good units. They should be counted as quality OEE losses. For operations with significant rework rates, this exclusion represents 2 to 4 percentage points of understated quality loss.

SECTION 4

Where Production Losses Actually Occur

Loss Category	Share of Total Losses	Primary Driver
Equipment Failures	30–40%	Inadequate PM, extended tool life
Setup and Adjustments	10–15%	Non-standardised changeover procedures
Minor Stoppages / Idling	20–30%	Material feed issues, sensor triggers
Reduced Speed	10–15%	Machine condition degradation
Process Defects	5–10%	Tooling wear, material variation
Reduced Yield / Startup	5–10%	Non-standardised startup procedures

Table 2: OEE Loss Distribution in Indian Discrete Manufacturing (Micraft Implementation Data)

The practical implication: improvement initiatives focused on unplanned equipment failures and minor stoppages will address 60 to 70% of achievable OEE improvement. Concentrating effort here delivers faster results than spreading equally across all six categories.

SECTION 5

The MES Implementation Variable

5.1 Why Deployment Speed Determines ROI

An MES that takes 12 months to deploy begins generating improvement data at month 13. An MES that deploys in 45 days begins generating improvement data at week 7. The cumulative value of improvement over a 24-month period is dramatically different. This is driven by deployment speed — not feature sophistication.

5.2 The Adoption Quality Problem

A system deployed quickly with poor operator adoption produces incomplete data. The critical adoption metric is downtime capture rate — the percentage of downtime events recorded with a specific reason code rather than a generic or no reason. An adoption rate below 80% means 20% of downtime is unclassifiable for root cause analysis.

Plants where supervisors act on live OEE data in the first two weeks consistently show better improvement outcomes at 6 months than plants that review data retrospectively.

SECTION 6

A Framework for Sustainable OEE Improvement

Phase 1 — Measurement Accuracy (Months 1–2)

Establish accurate baseline OEE from at-source, real-time data. Accept that the measured figure will be lower than the previous reported figure. Achieve greater than 85% downtime capture rate before proceeding to analysis.

Phase 2 — Pattern Analysis (Months 2–4)

Identify the top two or three assets by total downtime hours. Identify top reason codes by frequency and total hours. Classify failures by pattern type (time-based, random, maintenance-induced) to direct the correct intervention.

Phase 3 — Targeted Intervention (Months 3–6)

Design and implement improvements for identified high-loss assets. Revise preventive maintenance intervals from actual MTBF data. Implement post-maintenance verification checklists. Investigate process conditions generating minor stoppages.

Phase 4 — Continuous Improvement (Month 6+)

Verify improvement in OEE trend data. Repeat pattern analysis for the next priority. Implement predictive maintenance for assets with detectable failure precursors. Extend the improvement process systematically through the full asset base.

SECTION 7

Benchmarks and Performance Targets

Industry Category	Reported OEE (Manual)	Actual OEE (Real-time)	Realistic 12-Month Target
Automotive Machining (Tier 1/2)	75–82%	62–70%	68–76%
General Engineering / Fabrication	68–76%	58–66%	64–72%
Pharmaceutical Manufacturing	72–80%	64–72%	70–78%
Plastics and Rubber Processing	65–74%	58–66%	63–70%
Electronics Assembly	78–85%	70–78%	75–82%

Table 3: OEE Benchmarks for Indian Manufacturing by Category (Indicative Ranges — Micraft Implementation Data)

Note: These are indicative ranges. Individual results vary based on asset age, maintenance history, product mix, and operator skill. The 85% world-class benchmark is an aspirational target for mature TPM programmes — not an appropriate first-year improvement target.

SECTION 8

Conclusion

The OEE measurement gap in Indian manufacturing is not a minor technical issue — it is a fundamental obstacle to effective production improvement. Manufacturers who believe their OEE is 78% when it is actually 65% are calibrating their improvement targets, maintenance investments, and capacity planning decisions against an incorrect baseline.

The path to closing this gap requires accurate measurement from real-time, at-source data capture; systematic analysis of where losses actually occur; and a management culture that uses live operational data for in-shift decisions rather than compiled reports. The manufacturers who achieve 20 to 40% reductions in unplanned downtime are those who measured accurately, analysed systematically, and acted on data rather than assumption.

About Micraft Solutions

Micraft Solutions Private Limited is an enterprise software company headquartered in Pune, India, specialising in manufacturing, logistics, and distribution operations technology. For 18 years, Micraft has built software for the operational challenges of Indian manufacturing.

Micraft MES is deployed across 500+ client operations in automotive, engineering, pharmaceutical, and general manufacturing environments. The observations in this white paper reflect patterns observed across this deployment base.

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Product: Micraft MES — www.micraft.co.in/products/micraft-mes/