

The 100 Manufacturing KPIs That Matter

Formulas · Benchmarks · Practice notes — 2026 edition

OEE · Maintenance · Quality · Throughput · Delivery ·
Inventory · Cost · People & Safety · Energy

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How to use this KPI set

No plant steers 100 KPIs at once. This set is a reference: pick a handful per management level — typically OEE, unplanned downtime, FPY, OTIF and cost per unit as the core set — and define a data source, measurement frequency and owner for each one you adopt. Benchmarks are industry orientation, not a substitute for your own baseline: measure honestly for 4–6 weeks first, then set targets.

Formulas follow the common definitions (Nakajima/TPM for OEE, Shingo's SMED, OTIF from supply-chain practice). Where your house definitions differ: document the definition and keep it — comparability beats perfection.

OEE & Equipment Effectiveness

No.	KPI	Formula	Note / benchmark
1	OEE	Availability × Performance × Quality	World-class discrete manufacturing ca. 85%; most plants measure 55–65% once honestly instrumented.
2	Availability	Run time ÷ planned production time	Losses: breakdowns + setup/adjustment. World-class ca. 90%.
3	Performance	(Ideal cycle time × count) ÷ run time	Losses: micro-stops + reduced speed. Benchmark ca. 95%.
4	Quality rate	Good count ÷ total count	Losses: scrap + startup rejects. Benchmark ca. 99%.
5	TEEP	OEE × utilization (calendar time)	Potential against 24/7 calendar time — realistically far below OEE.
6	OOE	OEE against operating time instead of planned time	Middle ground OEE/TEEP; useful with volatile scheduling.
7	Planned production time	Shift time – planned breaks/stops	Base quantity; OEE comparisons are worthless without a clean definition.
8	Run time	Planned time – unplanned – setup stops	Numerator of availability.
9	Net operating time	Run time – speed losses	Basis of the performance rate.
10	Fully productive time	Net operating time – quality losses	Only time producing good parts at rated speed.
11	Setup time ratio	Setup time ÷ planned production time	Lever: SMED. A high ratio argues for changeover workshops before capex.
12	Micro-stop rate	Stops under 5 min per shift	Usually unrecorded; typically the largest hidden OEE loss.

Availability & Maintenance

No.	KPI	Formula	Note / benchmark
13	MTBF	Operating time ÷ number of failures	Track per asset, not just the plant average.
14	MTTR	Total repair time ÷ number of repairs	Top quartile achieves under 1 h; diagnosis and waiting drive it.
15	MTTA	Time to response start ÷ incidents	Measures the alarm/response chain, not the repair itself.
16	MTTF	Operating time ÷ failures (non-repairable parts)	For replace-not-repair components, instead of MTBF.
17	Inherent availability	MTBF ÷ (MTBF + MTTR)	Asset view without organisational waiting time.
18	Failure rate	Failures ÷ operating hours	Early indicator for ageing equipment.
19	Unplanned downtime	Sum of unplanned stops [h/month]	Industry average ca. 15 h/week; average cost per major incident is six figures.
20	Planned downtime	Sum of planned maintenance windows [h]	Track against unplanned time: the ratio should improve.
21	PM compliance	On-time PM work orders ÷ scheduled PM orders	Benchmark: above 90%; below that, maintenance tips into reactive mode.

No.	KPI	Formula	Note / benchmark
22	Reactive maintenance share	Reactive orders ÷ all orders	Best practice under 20–30%.
23	Maintenance cost per unit	Maintenance cost ÷ units produced	Comparable across lines; the trend matters more than the level.
24	Spare-parts availability	Demands served from stock ÷ all demands	Missing parts extend MTTR directly.
25	Maintenance backlog	Open orders in weeks of crew capacity	Healthy: 2–4 weeks; more = risk, less = idle capacity.
26	Wrench time	Productive tool time ÷ attendance time	Typically only 25–35%; levers are planning and material staging.

Quality

No.	KPI	Formula	Note / benchmark
27	First Pass Yield (FPY)	Defect-free first time ÷ units started	Global ca. 91%; semiconductor reaches 99%+.
28	Rolled Throughput Yield	$FPY(1) \times FPY(2) \times \dots \times FPY(n)$	Multiplied along the process chain; exposes the hidden factory.
29	Scrap rate	Scrap quantity ÷ total quantity	Report in units and euros; euros convince management.
30	Rework rate	Reworked units ÷ total quantity	Rework often hides inside FPY figures — measure separately.
31	Defect rate (ppm)	Defective parts × 1,000,000 ÷ total parts	Automotive suppliers commonly target single-digit ppm.
32	Complaint rate	Customer complaints ÷ shipped orders	External view of quality; pair with 8D cycle time.
33	Internal failure cost	Scrap + rework + sorting cost	Part of the cost of quality.
34	External failure cost	Warranty + recalls + claim handling	Rule of thumb: an external defect costs 10× an internal one.
35	Cpk	$\min(USL - \text{mean}; \text{mean} - LSL) \div (3 \times \text{sigma})$	Capability index; 1.33 is standard, safety-critical parts 1.67+.
36	Ppk	Like Cpk, computed on long-term variation	Comparing Cpk/Ppk reveals stability problems.
37	Startup scrap share	Startup-phase scrap ÷ total scrap	High share → fix changeover/ramp-up, not the steady state.
38	Supplier defect rate	Defective incoming parts [ppm]	Measure at incoming inspection and line feedback.

Throughput & Production

No.	KPI	Formula	Note / benchmark
39	Cycle time (actual)	Production time ÷ units produced	Compare with ideal cycle time = performance loss.
40	Ideal cycle time	Fastest demonstrably achievable cycle time	Basis of the performance rate; never use the catalogue value.
41	Takt time	Available time ÷ customer demand	Production takt above customer takt = backlog by design.
42	Throughput	Units ÷ time unit [pcs/h]	Report per line and per bottleneck.
43	Production volume	Units produced per period	Pair with schedule attainment or it is just an activity number.
44	Capacity utilization	Used capacity ÷ available capacity	Common target bands 80–85%; 100% is not a goal.
45	Bottleneck utilization	Bottleneck run time ÷ its available time	The one place where a lost hour is lost revenue.
46	Output per labour hour	Units ÷ hours worked	Normalise across the product mix.
47	Machine run time per shift	Run time ÷ shift length	Simple early indicator at shift level.

No.	KPI	Formula	Note / benchmark
48	Changeovers per week	Number of setups	Read with the setup-time ratio: many short changeovers can be fine.
49	Setup time (SMED)	Last good part A to first good part B	SMED target: single-digit minutes for series changeovers.
50	Ramp-up time after setup	Time to stable rated speed	Often longer than the setup itself — record separately.

Delivery & Schedule

No.	KPI	Formula	Note / benchmark
51	OTIF	Complete & on-time ÷ all deliveries	Benchmark above 95%; measure from the customer's view, not the plant's.
52	Delivery reliability	On-time deliveries ÷ all deliveries	Measure against the first confirmed date, not the latest one.
53	Lead time	Order intake to dispatch	Split into processing vs. waiting time with a value-stream map.
54	Manufacturing lead time	Material start to completion	Waiting typically exceeds 80% — the biggest lever.
55	Production schedule adherence	Finished on plan date ÷ all orders	Internal precursor of delivery reliability.
56	Plan attainment	Produced quantity ÷ planned quantity	Daily/shift level; make deviations explainable.
57	Schedule attainment (sequence)	Orders built in planned sequence ÷ all	Measures sequence discipline, not just volume.
58	Order backlog	Overdue orders [count, EUR]	The trend decides; classify by root cause.
59	Perfect order rate	Defect-free × on-time × complete × billed correctly	Chained ratio; the most honest single supply-chain number.
60	Rush-order response time	Release to production start for rush orders	Shows flexibility; weigh against plan disruption.

Inventory & Logistics

No.	KPI	Formula	Note / benchmark
61	Inventory turnover	COGS ÷ average inventory	Industry-specific; steer the trend per material class.
62	Days of coverage	Inventory ÷ average daily usage [days]	Differentiate by ABC/XYZ class.
63	WIP	Work-in-process in units / EUR	Tied directly to lead time via Little's Law.
64	Raw material coverage	Raw stock ÷ daily requirement	A deliberate buffer against supply risk — size it consciously.
65	Finished goods coverage	FG stock ÷ daily sales	High values = planning or demand problem.
66	Inventory accuracy	Matching count positions ÷ counted positions	Benchmark above 98%; the basis of any MES/ERP automation.
67	Space productivity	Output ÷ production area [pcs/m²]	For layout and investment decisions.
68	Picking error rate	Mispicks ÷ picks	Drives complaints and rework in dispatch.
69	DIO	Average inventory × 365 ÷ COGS	Finance view of inventory; align with CFO reporting.
70	Material availability	Orders without part shortage ÷ all orders	Shortages are a top-3 cause of unplanned downtime.

Cost & Economics

No.	KPI	Formula	Note / benchmark
71	Unit manufacturing cost	(Material + labour + overhead) ÷ units	Core KPI for make-or-buy and price floors.

No.	KPI	Formula	Note / benchmark
72	Material cost share	Material cost ÷ manufacturing cost	Often 50%+ — the largest cost lever.
73	Energy cost per unit	Energy cost ÷ units produced	Steer with per-asset load data, not the plant total.
74	Labour cost per unit	Wage cost ÷ units produced	Interpret through the automation level.
75	Machine hour rate	(Depreciation + operation + maintenance) ÷ run hours	Basis for honest downtime costing.
76	Cost of unplanned downtime	Downtime hours × hour rate + consequential cost	Ca. EUR 260k per severe incident, cross-industry average.
77	Cost of quality	Failure + appraisal + prevention cost	Typically 10–20% of revenue, usually underestimated.
78	Maintenance cost as %RAV	Annual maintenance cost ÷ replacement asset value	Best practice ca. 2–3%; above 5% = reactive operation.
79	Value added per employee	(Revenue – bought-in goods) ÷ headcount	Site comparison; normalise for vertical integration.
80	Overhead rate	Overhead ÷ direct cost	Distorted by high variant counts — review regularly.

People & Safety

No.	KPI	Formula	Note / benchmark
81	Labour productivity	Output ÷ hours worked	Pair with quality or it rewards speed over good parts.
82	Attendance rate	Days present ÷ scheduled days	Shift planning needs the rate per team, not per plant.
83	Absence rate	Sick days ÷ scheduled days	Benchmark locally; recent industry averages ca. 5–6% in EU manufacturing.
84	Turnover rate	Leavers ÷ average headcount	Onboarding costs productivity — value with learning curves.
85	Training hours per employee	Training hours ÷ headcount	Makes multi-machine operation and skill matrices visible.
86	Overtime rate	Overtime hours ÷ regular hours	Persistently above 10% = structural capacity problem.
87	LTIFR	Lost-time injuries × 1,000,000 ÷ hours worked	Standard safety benchmark figure.
88	TRIFR	All recordable incidents × 1,000,000 ÷ hours	Broader than LTIFR; leading indicator.
89	Near-misses reported	Count per period	Rising reporting is positive: safety culture.
90	5S audit score	Points achieved ÷ points possible	Order correlates measurably with micro-stops and search time.

Energy & Sustainability

No.	KPI	Formula	Note / benchmark
91	Energy per unit	kWh ÷ units produced	Basis for ISO 50001; report per product family.
92	Energy intensity	kWh ÷ revenue or value added	For site and year-on-year comparisons.
93	CO2e per unit	Scope 1+2 emissions ÷ units	Increasingly requested by customers (PCF).
94	Water per unit	m³ ÷ units produced	Relevant by process (cooling, cleaning).
95	Waste rate	Waste quantity ÷ input quantity	Read together with the scrap rate.
96	Recycling rate	Materially recycled ÷ total waste	Circular-economy direction; audit evidence.
97	Compressed-air leakage	Leakage loss ÷ air generated	Typically 20–30% loss — a fast savings lever.
98	Peak demand	Highest 15-min average load [kW]	Drives grid charges; reduce via load management.

No.	KPI	Formula	Note / benchmark
99	Renewable share	Renewable ÷ total consumption	Increasingly mandatory for reporting (CSRD).
100	Material yield	Good-part material weight ÷ input weight	Makes offcut and runner losses visible; a lever before purchase price.

Next step: from KPI to root cause

KPIs show THAT performance is lost — not why. The OEE platforms in our software ranking capture stops automatically at the machine and classify losses to causes. Find the 2026 ranking with the scoring rubric at manufacturing-metrics.org/en/blog/best-real-time-oe-monitring-software-2026/ · Disclosure: Manufacturing Metrics is a publication of TeepTrak SAS; TeepTrak appears in the ranking.