Formula 1

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Formula 2

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Formula 3

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Related Content

Title	Type	Slug
Cost-Per-Part Optimization Framework: Labor, Tooling, Energy & Overhead Allocation	sub_page	cost-per-part-optimization-framework
CNC Optimization Parameter Matrix (Aluminum/Ti/Inconel/Steel)	resource	cnc-parameter-matrix
Tool Path Strategy Decision Tree PDF	resource	tool-path-decision-tree
GD&T Warpage Compensation Checklist	resource	gd-t-warpage-compensation-checklist
CNC Machine Rigidity Mapping Template (Excel + MATLAB script)	resource	machine-rigidity-mapping-template
CNC Cost-Per-Part Breakdown Dashboard (Power BI)	resource	cnc-cost-dashboard

Detailed Explanation

The framework operationalizes ISO 50001’s core clauses—particularly Clause 6.4 (Energy Performance Indicators), Clause 8.1 (Operational Planning and Control), and Clause 9.1.1 (Monitoring, Measurement, Analysis and Evaluation)—by establishing causally grounded attribution rules. It begins with granular energy metering (sub-metering at machine or line level), followed by time-synchronized data collection aligned with production schedules (e.g., shift logs, machine runtime telemetry). Energy consumption is then normalized using validated drivers—most commonly machine hours—but extended to include dynamic factors such as load factor, power factor, and tariff period (peak/off-peak), ensuring costs reflect real-time grid conditions and contractual obligations. The framework mandates documentation of attribution logic, uncertainty quantification (e.g., measurement uncertainty per ISO/IEC 17025 principles), and periodic validation against energy baselines to support continual improvement (Clause 10.2). Practically, it enables accurate Machine Hour Rate (MHR) calculation—not as a static overhead rate, but as a dynamic, energy-integrated cost driver that informs pricing, capacity planning, and energy-saving ROI analysis. By embedding ISO 50001’s Plan–Do–Check–Act (PDCA) cycle, the framework also facilitates root-cause analysis of energy cost variances and supports certification readiness through auditable evidence trails.

Key Components

#	Component
1	Sub-Metered Energy Data Collection
2	ISO 50001-Compliant Energy Baseline & EnPI Design
3	Dynamic Attribution Logic (Time-of-Use, Load-Adjusted, Efficiency-Corrected)

Applications

#	Application
1	Calculating ISO-aligned Machine Hour Rates for true-cost manufacturing costing

#	Application
2	Supporting ISO 50001 internal audits and certification evidence packages
3	Enabling energy-aware production scheduling and bottleneck analysis

Related Concepts

#	Concept
1	Energy Performance Indicator (EnPI)
2	Measurement and Verification (M&V) per IPMVP
3	Machine Hour Rate (MHR) Accounting

Tags

> ISO50001, energy-costing, manufacturing-accounting, submetering, EnMS