Top 10 world-class maintenance measures

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1. Required capacity is simply running time required by production to meet customer demand, multiplied by design throughput. Required capacity time accounts for production and tool changeover downtime. For example, if production time is 3 shifts, 5 days/week, with production downtime of 4 hours/day, then: Required capacity time = (5 days/wk) x (20 hrs/day) x design throughput (units/hr) = 100 hrs/week

2. Percent utilized capacity is a measure of plant investment use. % Utilized capacity = % Required capacity time (100 hrs/wk) ÷ Total available capacity time (168 hrs/wk) x 100 = 60%

Knowing capacity utilization is vital, particularly if you're considering plant expansion. A 60% capacity utilization indicates that 40% of your plant investment is unused.

3. Actual availability, or uptime, is calculated by dividing the actual run time by Required Capacity time. Continuing with our example, if actual run time is 92 hours, with 8 hours of maintenance downtime, then Actual Availability is calculated this way:
Actual Availability = Actual uptime (92 hr.) ÷ Required capacity time (100 hrs) = 92%

The remaining 8 hours is "lost capacity" and must be bought elsewhere (usually on the weekend or third shift). This is the only costly portion of capacity. World-class maintenance organizations exceed 97% Actual Availability.

4. Maintenance contribution to cost per unit of production is a measure of the cost of the maintenance function contributed to each unit produced.

Maintenance Cost/Unit = Total maintenance cost/mo. ÷ Finished yield/mo. (units/mo.)
Total maintenance includes labor, overtime, overhead, depreciated value of maintenance spares and materials, depreciated value of redundant systems in the plant, and all other items attributable to maintenance.

5. Maintenance cost effectiveness is a budgeting approach that begins by establishing a theoretical maintenance cost per unit. This allows you to establish a budget that reflects production goals. Use you actual maintenance cost per unit to gauge performance.
Maintenance Cost Effectiveness = Theoretical maintenance cost/unit ÷ Actual maintenance cost/unit x 100

6. Maintenance margin measures the margin cost contribution of maintenance relative to sales.
Maintenance Margin = Total maintenance cost/mo. ÷ Company sales/mo.

Monthly maintenance costs are typically spread throughout operating expenses and cost of goods sold. This is inappropriate for production maintenance. Ideally, maintenance cost should be a separate, measured operating expense line item, complete with an expense per margin detail comparing maintenance costs with company sales and finished yield.
Here, by industry, are benchmark production maintenance margin percentages for world-class maintenance operations:

Automotive 6%
Chemical processing 8%
Electronics 3%
Machine tools/fab. metals 5%
Paper 9%
Petroleum production 9%

Primary metals 10%
Rubber/plastics 10%

7. Maintenance cost as a percentage of plant replacement cost measures the plant's investment in maintaining its assets. As a general rule, companies should be able to document plant appreciation values which roughly equal 50% of the total maintenance budget. If not, you are probably spending too much time on preventive and reactive activities versus predictive and proactive activities.

8. Maintenance off-quality measures off-quality product resulting directly from inadequate maintenance procedures (breakdowns, imbalance, out-of-alignment, etc.)

Off-Quality Maintenance = out-of-spec units resulting from maintenance ÷ Total out-of-spec units x 100
Off-quality benchmark data for world-class maintenance organizations are less than 9% of total off-quality.

9. Maintenance rework measures the number of duplicate work orders generated to correct previously completed work orders within a 12-month window. Benchmark organizations average 3%, and drive to reach 0%.

10. Percent redundant plant is a measure of the plant's holdings of redundant systems.

Percent Redundant Plant = Number of redundant systems ÷ Total plant systems.

While redundant systems are required in some applications, benchmark plants register an average of 4% maintenance-related redundancy, with newer plants closer to 0%.