Tool-Box Talk

Managing Asset Reliability with the Right KPIs

"You can't manage what you don't measure." - Peter Drucker

Performance measurement is a fundamental principle of managing asset reliability.

> *The measurement of performance is important because it identifies current performance gaps between current and desired performance and provides indication of progress towards closing the gaps.*

"Carefully selected key performance indicators identify precisely where to take action to improve performance"

Performance Metrics for the Maintenance Function

The Asset Reliability Process represents the collection of 'all' tasks required to support the maintenance function. The process is a supply chain. **"If a step in the process is skipped, or performed at a substandard level, the process creates defects known as failures".**

"The output of a healthy reliability process is optimal asset reliability at optimal cost."

Asset Reliability Process measures are **Leading indicators**. They monitor if the tasks are being performed that will **'lead to results'**. **Lagging Indicators "are the results".**

For example: a leading process indicator would monitor if the "Scheduling" function was effective. If people are doing all the right things then the results will follow. **Leading** – Schedule Compliance, **Lagging** – OEE.

Result measures monitor the products (output) of the Asset Reliability Process. Result measures include **maintenance cost** (as a contributor to total operating cost), **asset downtime due to planned and unplanned maintenance** (as a contributor to availability) and **number of failures on assets** (the measure of reliability: this can then be translated into mean time between failures).

> *Results measures "Lag". PM Compliance is a good example. If PM Compliance is low (Leading KPI) then one would expect failures to increase, as such "Maintenance Cost" or "MTBF" would be a "Lagging KPI".*

Preventive Maintenance Leading and Lagging KPIs

Leading KPIs:
- PM Compliance (using 20% Rule)
- % of PMs with Step by Step Instructions
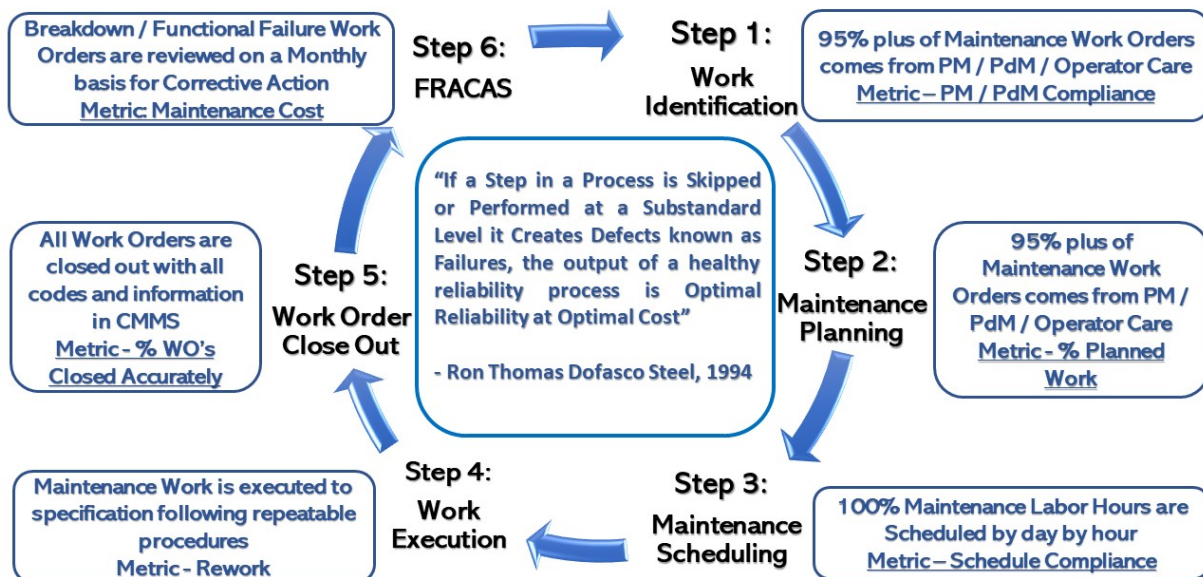- % of PMs evaluated monthly

Lagging KPIs:
- Maintenance Cost
- Production Capacity
- Emergency/Urgent Labor Hours
- Stockouts
- MTBF – Mean Time Between Failures
- MTTR – Mean Time To Restore

"Leading KPIs Lead to the Results, Lagging KPIs are the Results"

The *Maintenance Process* is made up of elements. All elements are required to complete the supply chain. Key Performance Indicators (KPIs) of the maintenance process are process assurance measures. They answer the question 'how do I know that this maintenance process element is being performed well?

Proactive Maintenance Continuous Improvement Loop

Breakdown / Functional Failure Work Orders are reviewed on a Monthly basis for Corrective Action
Metric: Maintenance Cost

Step 6: FRACAS

Step 1: Work Identification

95% plus of Maintenance Work Orders comes from PM / PdM / Operator Care
Metric – PM / PdM Compliance

"If a Step in a Process is Skipped or Performed at a Substandard Level it Creates Defects known as Failures, the output of a healthy reliability process is Optimal Reliability at Optimal Cost"

- Ron Thomas Dofasco Steel, 1994

All Work Orders are closed out with all codes and information in CMMS
Metric - % WO's Closed Accurately

Step 5: Work Order Close Out

Step 2: Maintenance Planning

95% plus of Maintenance Work Orders comes from PM / PdM / Operator Care
Metric - % Planned Work

Maintenance Work is executed to specification following repeatable procedures
Metric - Rework

Step 4: Work Execution

Step 3: Maintenance Scheduling

100% Maintenance Labor Hours are Scheduled by day by hour
Metric – Schedule Compliance
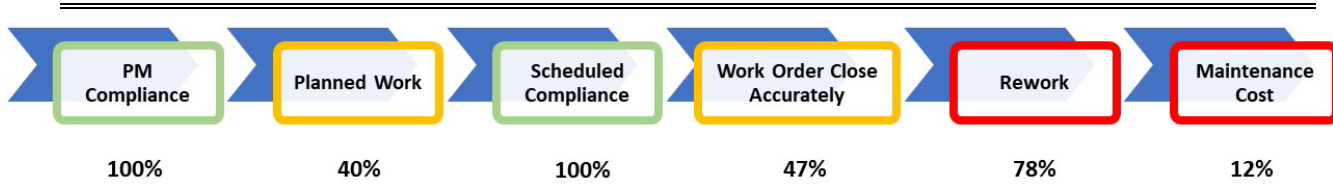
WORLD CLASS MAINTENANCE

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KPI Dashboard Examples

PM Compliance	Planned Work	Scheduled Compliance	Work Order Close Accurately	Rework	Maintenance Cost
100%	40%	100%	47%	78%	12%

Maintenance KPI Dashboard

PM Compliance	# Breaks to PM Schedule	PM/PdM Yield	PM/PdM Overdue	# PMS Evaluate	#PMs Optimized	EM/Urgent Labor Hours	PM Hrs.	PM Cost	OEE
100%	13	7	42	0	7	234	48	$3k	78%
SMRP		SMRP						SMRP	SMRP

Preventive Maintenance KPI Dashboard

Line Assets	# of Failures	Production Losses	EM/Urgent Labor Hrs.	PM Compliance
Board Infeed	127	1123	346	100%
Conveyor	21	489	469	100%
Press Unit	2	2312	18	98%
Hydraulics	47	324	110	95%
PLC / DCS	8	978	943	100%
DocArm Lift	64	1934	86	98%
Total	269	7160	1,999	99.8%

Plant Reliability Dashboard

% of Parts Assigned to an Asset	% of Parts with Min/Max/Reorder Point	# Total MRO Stockouts	EM Labor Hours	Critical Spares Stockouts	Stocked MRO Inventory Value	- OEE - Maintenance Cost - Production Rate

Maintenance Storeroom Dashboard