Allied Reliability delivers integrated Conditioned Based Monitoring (CBM) Technology Applications, Consulting Services, and Processes as part of an overall equipment maintenance program to build lasting return on investment and impact on asset health. www.alliedreliability.com

GPAllied is the most diverse manufacturing and industrial reliability and operations consulting, training, and services company in the world. This diversity enables us to develop significant value propositions for our clients by delivering solutions across different industries, geographies, and—most importantly—across different aspects of an operation. www.gpallied.com

Inspired Blended Learning (IBL) empowers participants to take control of their learning experience through instructor-led classes, online curriculum, and skill applications within your facility or industrial environment. IBL is aimed at maximizing the value of training for our clients employing advanced adult learning techniques that drive documented return on training dollars. www.ibltraining.com

Doug Plucknette is the worldwide RCM Discipline Leader for GPAllied and founder of RCM Blitz™. Doug has made key contributions to standard reliability measures for manufacturing and reliability training programs for engineers, managers, technicians, and skilled trades. Doug is the author of Reliability Centered Maintenance using... RCM Blitz™ and Clean, Green and Reliable and is a regularly invited speaker to industry and maintenance and reliability conferences.
Reliability Glossary
Glossary

**Action Plan**
The specific steps that must be taken to execute group decisions, including who does what by when.

**Area (or Zone) Maintenance**
Maintenance management scheme where area production cells are responsible for their own maintenance; denotes decentralized maintenance management.

**Asset**
Maintenance: Lowest level of equipment that requires monitoring maintenance cost, equipment history, and reliability information, i.e. Motor, VFD, Pump, Gearbox, Fan, Fan coil, etc.

**Backlog**
The total number of estimated labor hours, by craft and priority, required to complete all identified but incomplete planned and scheduled work. Used as an index in determining how well maintenance is keeping up with the rate of work generation. Used also to help establish the proper size and composition of the work force. (See Open Work Order File.)

**Backlog Purge**
The evaluation of backlog work orders that are duplicates, now considered as unnecessary, orders that the work has been completed, but not completed in the CMMS. The evaluation is conducted with representatives of Production, Maintenance and Work Planning. The identified work orders are then completed or cancelled in the CMMS with comments noting the reason for removing the work order from the backlog.
**Glossary**

**Benchmarking**
The process of measuring products, services, and practices against those of leading companies. Comparing processes and performance with others.

**Benefit Tracking**
A defined cost benefit from a work process that is tracked over a period of time.

**Best in Class**
A best-known example of performance in a particular operation. One needs to define both the class and the operation to avoid using the term loosely.

**Bottleneck**
Any resource whose capacity is equal to or less than the demand placed on it, or which controls the maximum rate of production of resources ahead or behind the resource in the process stream.

**Brainstorm**
A basic problem-solving tool which uses the unevaluated ideas of group members to generate a list of possible options. Brainstorming can generate lists of (1) problems, (2) causes, (3) solutions and (4) actions, or any list where the creativity of the group would open up new possibilities.

**Breakdown Maintenance**
The performance of maintenance to put failed equipment back on-line; the failure having occurred without early warning by the Preventive Maintenance System.
Glossary

Break-In-Work
Emergency or urgent work that breaks into scheduled work. Urgent work may have enough lead-time to be put on the Daily Schedule. See Reactive Maintenance.

Budget
A plan that includes an estimate of future costs and revenues related to expected activities. The budget serves as a pattern for and a control over future operations. 
MRO budget: Covers items needed for the operation of a facility, but are not part of the finished product. Capital Budget: Acquisition of equipment that is capitalized as a depreciable asset on a company’s balance sheet. Materials Budget: Covers a firm’s need for production materials and components.

Business Process Reengineering
A management approach aiming at improvements by means of elevating efficiency and effectiveness of the processes that exist within and across organizations. The key to BPR is for organizations to look at their business processes from a “clean slate” perspective and determine how they can best construct these processes to improve how they conduct business.

Business process reengineering is also known as BPR, Business Process Redesign, Business Transformation, or Business Process Change Management.

Capacity Constraint Resources
Non-bottleneck resources that, based on the sequence in which they perform their jobs, can act as a constraint.

Capital Project
Work authorized by a capital fund authorization.
Glossary

**Chronic Problem**
One which is characterized by long duration or frequent occurrence; one which we’ve chosen to live with and have accepted as a standard.

**Computerized Maintenance Management System**
Computerized systems that schedule, track and monitor maintenance activities and provide cost, component item, tooling, personnel and other reporting data and history.

**Conditional Probability of Failure**
The probability that a failure will occur in a specific time period, provided that the item concerned has survived to the beginning of that period.

**Corrective Action**
Solving problems; identifying and resolving problems.

**Corrective Maintenance**
Maintenance required to restore an item to a satisfactory condition, usually identified by PM activity. It can be emergency, urgent or planned work.

**Cost Center**
The smallest segment of an organization for which costs are collected and formally reported, typically a department. The criteria in defining cost centers are that the cost be significant and that the area of responsibility be clearly defined. A cost center is not necessarily identical to a work center; normally a cost center encompasses more than one work center, but this may not always be the case.
Glossary

Covariance
The impact of one variable upon others in the same group.

Critical Asset
Assets identified as critical by reliability engineering that, when unable to perform, cause severe consequences for the plant or facility and lead to a shutdown of production.

Critical Spares
Key parts and/or components of an asset that need to be in stock or readily available because of the potential production, service and/or financial implications of an equipment failure requiring these materials.

Deferred Maintenance
Maintenance that can be postponed to some future date without further deterioration of equipment.

Delphi Method
A quantitative Forecasting Technique where the opinions of experts are combined in a series of iterations. The result of each iteration is used to develop the next, so that convergence of the experts’ opinions is obtained.

Desired Performance
The level of performance acceptable to the owner or user of a physical asset or system.

Downtime
Time when the machines in the plant are not producing because they are broken or down for repairs or other reasons (idle time).
**Glossary**

**Emergency Repairs**
Immediate repairs needed as a result of failure or stoppage of critical equipment during a scheduled operating period. Imminent danger to personnel and extensive further equipment damage as well as substantial production loss will result if equipment is not repaired immediately. Scheduled work must be interrupted and overtime, if needed, would be authorized in order to perform emergency repairs. Emergency repairs should be completed within one day after discovery.

**Empowerment**
To invest with power or give authority to complete.

**Enterprise Asset Management**
Information system that integrates all asset-related applications for an entire enterprise. Incorporates at least maintenance management, financial / budgeting, materials management, and reliability functionality.

**Enterprise Resource Planning**
Information system that integrates all related applications for an entire enterprise. Industry term for the broad set of activities, supported by multi-module application software to help manage the business, including (1) Product Planning; (2) Parts Purchasing; (3) Maintaining inventories; (4) Interacting with suppliers; (5) Providing customer service; and (6) Tracking orders.

**Equipment Maintenance Plan**
A plan for maintaining equipment based on asset criticality and best life cycle costs.
Glossary

Environmental Consequences
The result of a failure mode and/or multiple failures that could have environmental consequences if it could breach any corporate, municipal, regional, national, district, or international environmental standard or regulation, which applies to the physical asset or system under consideration.

Equipment Repair History
The chronological listing of significant repair actions performed on key units of equipment so that chronic, persistent problems can be identified and corrected. Historic repair actions also help guide current repairs. Used as the basis for developing a forecast. (See Forecasting.)

Evident Failure
A failure mode that will on its own become evident to the opening crew under normal circumstances.

Failure Analysis
The act of determining the physical failure mechanism resulting in the functional failure of a component or equipment.

Failure Code
Codes used for recording failure types in CMMS.

Failure Coding
Classification of equipment failure events for the purpose of data analysis and trending. Normally, four types of failure codes available for use in many CMMS are: Part, Damage, Cause, and Activity.
Glossary

**Failure Consequences**
The way(s) in which a failure mode or a multiple failure matters.

**Failure Effect**
Occurs when a failure mode happens.

**Failure Evaluation Mode Analysis**
A procedure in which each potential failure mode in every sub-item of an item is analyzed to determine its effect on other sub-items and on the required function of each item.

**Failure Finding Task**
Scheduled task that determines when a specific hidden failure has occurred.

**Failure Management Policy**
Statement or purpose that does include on-condition tasks, scheduled restoration, scheduled discard, failure finding, run to failure, and redesign.

**Failure Mode**
One event causing a functional failure; the different ways a component can fail to perform as intended.

**Failure Mode and Effects Analysis**
Identifying how equipment can fail, why it might fail, and how best to address potential failure; may or may not include criticality.
GLOSSARY

FAILURE REPORTING, ANALYSIS, AND CORRECTIVE ACTION SYSTEM
Assists in identifying and planning effective corrective actions.

FIVE WHY
The 5 whys typically refers to the practice of asking, five times, why the failure has occurred in order to get to the root cause/causes of the problem. There can be more than one cause to a problem as well. Failure to determine the root cause assures that you will be treating the symptoms of the problem instead of its cause, in which case, you will continue to have the same problems over and over again.

FUNCTION
That which the owner or user of a physical asset or system wants it to do.

FUNCTIONAL FAILURE
The practice of grouping machines or activities by type of operation performed.

GOAL
The end towards which effort is directed. Goals are the steps directed towards the obtainment of an objective; as such, goals are more specific than objectives.

HIDDEN FAILURE
Failure occurring that is not detectable by or evident to the operating crew.
Glossary

Hidden Function
Function that is not detectable by or evident to the operating crew.

Impact
The effect in dollars of a problem. High impact problems are addressed first. Measured by analysis of “cost of quality.”

Initial Capability
Level of performance for which a physical asset or system is capable of at the moment it enters service.

Key Performance Indicator
Historical data that provides current status and trend information regarding the effectiveness of work processes, e.g. productivity/operating costs, maintenance labor and material costs, and performance/availability data.

Main Function
The function constituting reasons why a physical asset or system is acquired by its owner or user.

Maintenance
The routine, recurring repair and upkeep required to keep facilities and equipment in a safe effective condition enabling it to be utilized at original design capacity and efficiency or some other level specified by management as the maintenance objective. Maintenance is normally an operating cost, although some projects, such as overhauls, performed with maintenance resources may be capitalized. The term maintenance means capacity assurance, to minimize downtime, increase production, and maximize profits.
MAINTENANCE ENGINEERING
A staff effort aimed at ensuring that maintenance techniques are effective, that equipment is engineered for maximum maintainability, that persistent and chronic problems are discovered and corrective actions or modifications made. Responsible for review or the adequacy of repair materials used in maintenance; determination of critical parts and adequacy of stocking levels of replacement parts; monitoring the utilization of the maintenance work force; preparation of specifications for repair and new equipment selection, and other related similar actions.

MAINTENANCE MANAGEMENT
Management and control of maintenance functions.

MAINTENANCE MATERIAL(S)
The parts and supplies used to maintain and repair plant equipment and facilities.

MAINTENANCE SUPPLIES
Commonly used support items that aid in maintaining and repairing plant equipment and facilities.

MAINTENANCE WORK
The repair and upkeep of existing equipment, facilities, buildings or areas in accordance with current design specifications to keep them in a safe, effective condition while meeting their intended purposes.

MAINTENANCE WORK ORDER
A formal document for controlling planned and scheduled work.
**Glossary**

**Maintenance Work Order System**
A means of communicating maintenance needs, planning, scheduling, controlling work and focusing field data to create information.

**Maintenance Work Request**
An informal document for requesting unscheduled or emergency work or a format for requesting all maintenance work. In the latter usage, once the MWR is approved, it becomes a MWO.

**Mean Time Between Failure**
An indicator of the overall reliability of an item. The mean time between failures of a repairable item that repaired and returned to use.

**Mean Time To Failure**
An indicator of the overall reliability of an item. The mean time between failures of a non-repairable item.

**Mean Time To Repair**
An indicator of the overall maintainability of an item (includes impact of design, accessibility, and efficiency of the craftsperson effecting the repair). The mean time taken to repair failures of a repairable item.

**Measurable**
Capable of being compared to a standard.

**Multiple Failure**
Event occurring if a protected function fails while its protective device or protective system is in a failed state.
**Glossary**

**Non-Destructive Testing**
Techniques intended to predict wear rate, state of deterioration or imminent equipment failure. Techniques include dye penetrant testing, magnetic particle inspection, ultrasonic thickness testing, and the like. May also include other predictive technologies such as vibration analysis, oil sampling, airborne ultrasonic’s, thermography, etc.

**Non-Operational Consequence**
Failure mode, with non operational consequences, that is not hidden, and does not have safety, environmental or operational consequences.

**Non-Value Added**
Activities or actions taken that add no real value to the product or service making such activities or action a form of waste.

**Objective**
Something towards which effort is directed; an aim, goal or end of action. A strategic position to be attained or a purpose to be achieved. Objectives are statements of general plans towards which an organization’s efforts are directed.

**On-Condition Task**
A scheduled task that is used to determine whether a potential failure has occurred.

**Open-Ended Questions**
Questions that require a response and solicit information such as who, what, where when, why, or how.
Glossary

Open Work Order File
A listing of all work orders currently open.

Operating Context
Circumstances in which a physical asset or system is expected to operate.

Operating Maintenance
Specific maintenance activities accomplished by production/operations personnel in direct support of Changeover activities (Examples: Cleaning; adjustment; lubrication; replacement of parts, asset setup, test asset operation prior to product run), or repair/replacement of production-related parts (knives, blades, belts) normally worn and requiring replacement during normal operations.

Operational Consequence
Failure mode or multiple failures that has operational consequences if it could adversely affect the operational capability of a physical asset or system (output, product quality, customer service, military capability, or operating costs in addition to the cost of repair).

Operator Care
Specific, detailed activities accomplished by operators to ensure proper asset operation, routinely check asset operating parameters (pressure, temperature, speed, etc), make necessary adjustments, lubricate, and make minor repairs incidental to the production process, and provide early detection of potential problems requiring maintenance support.
Glossary

Opportunity Cost
The return on capital that could have resulted had the capital been used for some purpose other than its present use. It usually refers to the best alternative use of the capital; at other times, however, to the average return from feasible alternatives.

Optimization
Achieving the best possible solution to a problem in terms of a specified objective function.

Overall Equipment Effectiveness
OEE is a metric used to monitor the effective use of equipment. It is obtained from the product of three ratios: 1. Availability ratio – Time for which equipment was available for operation. 2. Performance ratio – Rate of production divided by capacity of machine to produce. 3. Quality ratio – Quantity of ‘right the first time’ production divided by total production (‘right the first time’ + setoff + scrap).

Pareto Analysis
A problem-solving tool that helps arrange collected data so that comparisons can be made about problem causes. “Pareto’s Principle” states that results and causes of results are not equally distributed, but that 80% of the results come from 20% of the causes. Therefore, teams can focus their efforts on eliminating/reducing the 20% of the causes that will produce results. The “Pareto Chart” displays the data.

Perfection
Always optimizing value-added activities and eliminating waste.
Glossary

Performance Indices
Ratios, graphs, etc., which convey, at a glance, short-term accomplishments versus long-term trends.

Plan, Do, Check, Act

plan Senior management should use the visioning process in the context of its Business Plan. HP translates the Business Plans to action plans, meaningful to all levels of the organization. Do Answer the whats, hows, and whos for the total number of tiers for your organization; remember, the fewer the number of tiers, the better. Also, this is the time to bring management together and provide them with a basic understanding of HP mechanics. Check On a periodic basis, review the measurements and note what you’ve learned that can help in the future. Act Make the necessary adjustments to plans and priorities in order to ensure the success of the strategy breakthroughs.

Planning
Determination of resources needed and the development of anticipated actions necessary to perform a scheduled major job. An orderly appraisal and guarantee of all the prerequisites necessary to ensure completion of a given job at a predetermined time. It covers availability of ordered equipment, stores, materials, production, shutdowns, sketches, prints, specifications, etc.

Potential to Failure Curve
Comparative charting of different approaches to maintenance and the incidence of failure. Graph that illustrates progress of detectable equipment defects and associated maintenance costs.
Glossary

**Potential to Failure Interval**
Interval between the point at which a potential failure becomes detectable and the point at which it degrades into a functional failure. (Also known as ‘failure development period’ or ‘lead time to failure.’)

**Predictive Maintenance**
The use of instruments and analysis to determine equipment condition in order to predict failure before it takes place so corrective maintenance can be done in a planned and scheduled fashion. Examples include vibration analysis, oil analysis, thermography, airborne ultrasonic’s, NDT, motor current signature analysis, trending of process parameters, etc.

**Preventive Maintenance**
Time or cycle based actions performed to prevent system functional failure. This proactive maintenance type generally includes scheduled restoration and scheduled discard tasks.

**Priority**
The relative importance of a single job in relationship to other jobs, operational needs, safety, equipment condition, etc., and the time-frame within which the job should be done. Used primarily for Planned Work which subsequently will be scheduled.

**Priority Worksheet**
A problem-solving tool used to help in decision making; similar to Triadic Evaluation except that options are rated against several criteria.
Glossary

**Proactive Maintenance**
Maintenance activities designed to minimize the risk of failure of plant or equipment and keep equipment running as intended.

**Problem/Cause**
A serious condition or situation which prevents us from doing our job right the first time. The problem/cause is the difference between our current output and our desired output. It could be chronic or sporadic.

**Problem/Cause Statements**
Identified effects, clearly understood by the group and stated in terms that reflect the impact of the problem/cause.

**Procedure**
A series of steps followed in a regular definite order in which activities or tasks are to be carried out.

**Program Evaluation and Review Technique**
A network planning technique for the analysis of a project’s completion time. It uses an algorithm that permits identification of the critical path, the string of sequential activities that determines the project’s completion time. PERT time estimates are probabilistic, based on pessimistic, most likely, and optimistic time estimates for each activity.

**Quality**
Meeting the measurable requirements agreed upon with the customer.
Glossary

RASI/RACI Chart
A matrix to show Responsibility, Accountability, Support/Consult, and Inform roles for each step of a work flow process.

Reactive Maintenance
Maintenance that takes place as a result of an equipment failure, imminent threat of failure or equipment performance issue.

Reengineering
The engine that drives Time-Based Competition. To gain speed, firms must apply the principles of reengineering to rethink and redesign every process and move it closer to the customer.

Regulations
Rules that are concerned with methods of activity or performance. Both rules and regulations are derived from the broader policies of the organization.

Reliability
The probability that an item can perform its intended function for a specified interval under stated conditions. (MIL-STD-721C)

Reliability Centered Maintenance
A process used to determine the maintenance requirements of physical assets in their present operating context.
**Glossary**

**Reliability Engineering**
That set of design, development and manufacturing tasks by which reliability is achieved. See RELIABILITY. The main objectives of this strategic minded staff function performing reliability engineering are: (1) To apply engineering knowledge and specialist techniques to prevent or reduce the likelihood or frequency of failures. (2) To identify and correct the causes of failures that do occur. (3) To manage identified risk by determining the best ways of coping with (mitigating) the effects of failure if and when they do occur. (4) To apply methods for estimating the likely reliability of assets and for analyzing reliability data.

**Repair History**
The chronological listing of significant repairs made on key units of equipment and the analysis of these repairs to help identify chronic, repetitive problems, failure trends and the life-span of critical components.

**Replacement**
The process of removing badly worn parts (chains, belts, bearings, seals, gaskets, etc.) that are no longer capable of being adjusted. Scheduled replacement is performed to avoid costly repairs.

**Replacement Asset Value**
The current purchase price of the asset plus any costs necessary to prepare the asset for use.

**Replacement Materials Standard**
Materials that can be used on more than one component or piece of equipment.
**Glossary**

**Requested Maintenance**
A request for maintenance service that did not emanate from the PM system, but did provide sufficient lead-time to allow proper, proactive, planning and scheduling.

**Requirement**
Documented and agreed upon standards that specify what is to be done and the expected outcome.

**Requirements Analysis**
The practice used to analyze supplier/customer relationships and stakeholder needs to make sure clear requirements have been communicated.

**Resource Utilization**
The period of time in which the resource is adding value to the organization.

**Return on Investment**
Typically used to determine the financial viability of a project and expressed as a percentage of the earnings produced by an asset to the amount invested in the asset. (Net Benefit / Total Cost).

**Right Size**
Matching tooling and equipment to the job and space requirements of lean production.

**Root Cause Analysis**
A systematic approach to problem solving that utilizes a set of techniques to identify physical, human, systemic and latent causal factors.
Glossary

Routine Maintenance
Prescribed services that are performed at a set frequency using standard procedures.

Run-to-Failure
A failure management policy permitting a specific failure mode to occur without any attempt to anticipate or prevent it.

Safety Consequences
The effects of a failure mode that results in death, injuring or near miss.

Schedule Compliance
The percentage to which the weekly schedule was adhered to, calculated as the percentage of scheduled labor hours completed against total scheduled labor hours.

Scheduled Discard
A task designed to dispose of an item or component at a specified age limit, regardless of its condition.

Scheduled Maintenance
Repairs, rebuilds, overhauls and servicing that requires a minimum of 7 days to plan, obtain materials and schedule the availability of equipment and labor.

Scheduled Restoration
A task designed to restore the initial capability of an item or component at a specified age limit, regardless of its condition.
SCHEDULED SHUTDOWN
The scheduled removal of a facility from service to open, clean, inspect, repair, add, alter, close and test operating components; then return of the facility to service with a predetermined interval of time.

SCHEDULING
Determination of the best time to perform a planned maintenance job to appreciate operational needs and the best use of maintenance resources. A system of accomplishing engineering and maintenance at a predetermined time that coincides as closely as possible with the date on which the work is required. It implies the orderly use of engineering and craft skills to accomplish the greatest good at any particular time. A joint function of Maintenance and Production.

SCRAP
Material outside of specifications and/or possessing characteristics that make retention or rework impractical. Unusable or unsellable items.

SERVICEABILITY
Design characteristic that allows easy and efficient performance of service activities. A measure of the degree to which servicing of an item will be accomplished within a given time under specified conditions.

SIMPLIFIED FAILURE MODES AND EFFECTS ANALYSIS
A focused approach to identify likely failure modes and their associated risk to the business.
Glossary

Seven Wastes
Categories of the inefficiency commonly found in manufacturing processes.
(1) overproduction ahead of demand
(2) waiting for the next processing stop
(3) transportation of materials or information
(4) processing of parts due to poor tool or product design or misunderstood customer requirements
(5) inventories above the absolute maximum
(6) unnecessary motion by employees during the course of their work
(7) product defects resulting in scrap

Single Minute Exchange of Dies
A systematic approach used to improve changeover and maintenance procedures with the goal of minimizing equipment downtime. Also referred to as Quick Changeover.

Single Point Lesson
A training device that covers one topic in under 15 minutes using simple text and graphics.

Single-Piece Flow
The movement of parts, products or units in a manufacturing processes one piece at a time.

Scheduled Discard
A task designed to dispose of an item or component at a specified age limit, regardless of its condition. availability of equipment and labor.
**Glossary**

**Six Sigma**  
Six Sigma is a process improvement strategy, originally developed by Motorola, that’s designed to remove the causes of defects and errors in manufacturing and business processes using a statistical methodology called DMAIC (Design, Measure, Analyze, Improve, Control). Six Sigma creates a special infrastructure of people within the organization (“Black Belts”) who are experts in the facilitation of the DMAIC process.

**Solution**  
An activity that eliminates (or reduces the impact of) a root cause.

**Spare Parts List**  
A list of recommended items and quantities that should be kept on hand or readily available to effectively maintain an asset.

**Specialized Spare Parts**  
Parts that are used in and are unique to specific equipment components and equipment.

**Specifications**  
Technical definition of configuration or performance requirements to meet intended utilization of equipment or materials.

**Sporadic Problem**  
A problem that is characterized by only occasional occurrence or by scattered instances; also a problem that triggers alarm signals and requires a response.
**Glossary**

**STANDARD OPERATING PROCEDURE**
A written procedure used to ensure reasonable uniformity each time a significant task is performed.

**STANDARD REPLACEMENT PARTS**
Parts that can be used on more than one component or piece of equipment. These parts may be carried in stock by suppliers for a number of users. Delivery lead times are predictable so stockouts can be managed.

**STANDARD WORK**
A precise description of each work activity specifying cycle time, takt time, the work sequence of specific tasks, and the minimum inventory of parts on hand needed to conduct the activity.

**STANDARDS**
An established norm or requirement. It is usually a formal document that establishes uniform engineering or technical criteria, methods, processes and practices.

**STEP DEFINITION**
A definition of each step of the workflow process.

**SUB-ASSEMBLY**
Logical group of assets that serves a common function within an assembly, i.e. Pump drive train, Fan drive train, Chilled water within AHU, steam system with AHU etc. A component assemblies that are part of a larger assembly.
Glossary

Sub-Optimization
Situation where a process, procedure, or system yields less than the best possible outcome or output, caused by a lack of best possible coordination between different components, elements, parts, etc.

Sunk Cost
The un-recovered balance of an investment. It is a cost, already paid, that is not relevant to the decision, concerning the future that is being made. Capital already invested that for some reason cannot be retrieved. A past cost that has no relevance with respect to future receipts and disbursements of a facility undergoing an economic study. This concept implies that since a past outlay is the same regardless of the alternative selected, it should not influence the choice between alternatives.

Support Function(s)
Functions which a physical asset or system has to fulfill while meeting its primary function, such as those needed to fulfill regulatory requirements and those which concern issues such as protection, control, containment, comfort, appearance, structural integrity, and energy efficiency.

Symptom
Evidence that a problem/cause exists. This evidence needs to be clarified to determine the impact of the problem/cause.

System
1) An orderly, habitual or routine method, or methods, by which the regular activities of a part of a business, like maintenance, are executed. 2) A grouping of machines and components which work collaboratively to meet a specific function.
Glossary

Tank Inventory
Goods stored in tanks. These goods may be raw materials, intermediates, or finished goods. The description of inventory as tank inventory indicates the necessity of calculating the quantity on hand from the levels within the tanks.

Target
A specific, quantitative measurement established in order to measure progress towards a goal.

Technically Feasible
Task(s) physically possible to reduce or enable action to be taken to reduce the consequences of the associated failure mode to an extent that might be acceptable to the owner or user of the asset.

Theory of Constraints
A system management philosophy that focuses on removing limiting factors or bottlenecks in order to increase system output while decreasing operating costs.

Thermography
A predictive maintenance method that detects infrared energy emitted from an object, converts it to temperature, and displays an image of the temperature distribution.

Throughput Time
The time required for a product to proceed from concept to launch, order to delivery, or raw materials into the hands of the customer. This includes both processing and queue time.
TOLERANCE
Allowable departure from a nominal value established by design engineers that is deemed acceptable for the functioning of the product or service over its life cycle.

TOLERANCE LIMITS
The upper and lower extreme values permitted by the tolerance. In work measurement, the limits between which a specified operation time value or other work unit will be expected to vary.

TOOL CALIBRATION FREQUENCY
The recommended length of time between tool calibrations. It is normally expressed in days.

TOTAL COST
Sum of all costs, regardless of which department or firm incurs them.

TOTAL INVENTORY VALUE
The average sum of all on-hand inventory from the first day to the last day of a given month, quarter or year.

TOTAL PRODUCTIVE MAINTENANCE
An approach to proactive maintenance that optimizes equipment effectiveness, eliminates breakdowns and promotes autonomous operator maintenance through day-to-day activities involving the total work force.

TOTAL QUALITY MANAGEMENT
A business management strategy aimed at embedding awareness of quality in all organizational processes. TQM has been widely used in manufacturing, education, call centers, government, and service industries, as well as NASA space and science programs.
Glossary

Ultrasound
Similar to vibration analysis, ultrasound is a sound wave or frequency generated by the release of energy. As a predictive maintenance technology, ultrasonic testing can be both passive, listening, or active by emitting an ultrasonic pulse and analyzing the echo return. Ultrasound is often used to find compressed air or steam leaks, or to identify structural defects within a material.

Unplanned Maintenance
Work completed with no job plan -- often used to describe breakdown, break-in or unscheduled work.

Unscheduled Repairs
Non-emergency work that could result in becoming an emergency/breakdown if not addressed. Work that must be completed in the current scheduled week. A decision between production supervision and maintenance as to what work will be interrupted in the current week’s schedule to allow this work to take place.

Valuation
The technique of determining worth, typically of assets and inventory.

Value
1) Capability or quality provided to a customer for which they will pay a fair market price. 2) Performance of an asset that supports the organization’s strategic objectives.

Value Stream
The specific activities required to design, order and provide a specific product, from concept to launch, order to delivery, and raw materials into the hands of the customer.
Glossary

Value Stream Mapping
A visual representation of how product or materials flow from supplier through manufacturing to the customer in order to identify value-adding and non-value adding activities, takt time requirements, and other process improvement opportunities.

Value-Added Analysis
An activity where a process improvement team strips the process down to its essential elements. The team isolates the activities that in the eyes of the customer actually add value to the product or service. The remaining non-value adding activities (“waste”) are process improvement opportunities.

Vibration Analysis
This Predictive Maintenance technique is widely used to evaluate mechanical rotating equipment to determine if any undesirable changes are present that might give an early indication of imminent failure. Uses transducers to translate a vibration amplitude and frequency into electronic signals to determine the equipment’s actual condition. This may lead to the recommendation of a logical course of maintenance actions to correct the problem before secondary damage or catastrophic failure can occur. Additionally Vibration Analysis can be used for the modeling, prediction, measurement and analysis of structural dynamic response in design and root cause failure analysis. In design, vibration modeling and prediction is used to anticipate and avoid undesirable dynamic response. In root cause failure analysis it is used both to understand undesirable response and as a factor in determining true root cause.
**Work Order**
An order to the machine shop for tool manufacture or to the maintenance department for equipment maintenance or repair. Authorization to start work on maintenance.

**Work Sampling**
The statistical measure of the utilization of labor to determine productivity.

**Work Type**
The types of work that make up the workload performed by Maintenance. Typical: PM, emergency, urgent and planned work.

**Workforce**
The personnel who carry out the work of operating and maintaining a facility.

**World Class**
The philosophy of being the best, the fastest, and the lowest cost producer of a product or service. It implies the constant improvement of offerings to remain an industry leader and provide the best choice for customers.

**World Class Quality**
A term used to indicate a standard of excellence: The best of the best.

**Yield**
Produced product related to scheduled product –OR– percentage of a process or product that is free from defects.
Reliability Acronyms
ACRONYMS

AFR
Actual Failure Rate; Annualized Failure Rate; or Average Failure Rate

AHM
Asset Health Management

AHM
Asset Health Matrix (iReliability tool)

ALT
Accelerated Life Testing

ANOVA
Analysis of Variance

ASTR
Accelerated Stress Testing and Reliability

BPR
Business Process Reengineering

CBM
Condition Based Maintenance

CI
Continuous Improvement

CM
Condition Monitoring

CMMS
Computerized Maintenance Management System
ACRONYMS

CPI
Continuous Performance Improvement

EAM
Enterprise Asset Management

EMP
Equipment Maintenance Plan

EOL
End-of-Life

ERP
Enterprise Resource Planning

FAR
Failure Analysis Report or Request

FEMA
Failure Evaluation Mode Analysis

FMA
Failure Mode Analysis

FMEA
Failure Mode and Effects Analysis

FMECA
Failure Mode, Effects, and Criticality Analysis

FRACAS
Failure Reporting, Analysis, and Corrective Action System
ACRONYMS

FRB
   Failure Review Board

MTBF
   Mean Time Between Failure

MTBR
   Mean Time Between Repair

MTCE
   Maintenance

MTTF
   Mean Time To Failure

MTTR
   Mean Time To Repair (or Restore)

MWO
   Maintenance Work Order

MWR
   Maintenance Work Request

OEE
   Overall Equipment Effectiveness

PdM
   Predictive Maintenance

P-F Curve
   Potential to Failure Curve
Acronyms

**P-F Interval**
Potential to Failure Interval

**PM**
Preventive Maintenance

**PME**
Preventive Maintenance Evaluation

**POA**
Plan of Action

**QA**
Quality Assurance

**QC**
Quality Control

**R5**
Recognize, Rationalize, Ratify, Resolve, Realize

**RACI**
Responsible, Accountable, Consult, Inform

**RASI**
Responsible, Accountable, Support, Inform

**RCA**
Root Cause Analysis

**RCFA**
Root Cause Failure Analysis
ACRONYMS

RCM
Reliability Centered Maintenance

RE
Reliability Engineering

RE-ME
Reliability Engineering – Maintenance Engineering
(work stream)

RME
Reliability & Maintenance Engineering

ROA
Return on Assets

ROAR
Return on Asset Reliability

ROI
Return on Investment

RTF
Run-to-Failure

SME
Subject Matter Expert

SOP
Standard Operating Procedure

WO
Work Order

WR
Work Request