INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE, IT AND MANAGEMENT

CONTENTS

CALL FOR MANUSCRIPTS

We invite unpublished novel, original, empirical and high quality research work pertaining to recent developments & practices in the area of Computer, Business, Finance, Marketing, Human Resource Management, General Management, Banking, Insurance, Corporate Governance and emerging paradigms in allied subjects like Accounting Education; Accounting Information Systems; Accounting Theory & Practice; Auditing; Behavioral Accounting; Behavioral Economics; Corporate Finance; Cost Accounting; Econometrics; Economic Development; Economic History; Financial Institutions & Markets; Financial Services; Fiscal Policy; Government & Non Profit Accounting; Industrial Organization; International Economics & Trade; International Finance; Macro Economics; Micro Economics; Monetary Policy; Portfolio & Security Analysis; Public Policy Economics; Real Estate; Regional Economics; Tax Accounting; Advertising & Promotion Management; Business Education; Business Information Systems (MIS); Business Law, Public Responsibility & Ethics; Communication; Direct Marketing; E-Commerce; Global Business; Health Care Administration; Labor Relations & Human Resource Management; Marketing Research; Marketing Theory & Applications; Non-Profit Organizations; Office Administration/Management; Operations Research/Statistics; Organizational Behavior & Theory; Organizational Development; Production/Operations; Public Administration; Purchasing/Materials Management; Retailing; Sales/Selling; Services; Small Business Entrepreneurship; Strategic Management Policy; Technology/Innovation; Tourism, Hospitality & Leisure; Transportation/Physical Distribution; Algorithms; Artificial Intelligence; Compilers & Translation; Computer Aided Design (CAD); Computer Aided Manufacturing; Computer Graphics; Computer Organization & Architecture; Database Structures & Systems; Digital Logic; Discrete Structures; Internet; Management Information Systems; Modeling & Simulation; Multimedia; Neural Systems/Neural Networks; Numerical Analysis/Scientific Computing; Object Oriented Programming; Operating Systems; Programming Languages; Robotics; Symbolic & Formal Logic and Web Design. The above mentioned tracks are only indicative, and not exhaustive.

Anybody can submit the soft copy of his/her manuscript **anytime** in M.S. Word format after preparing the same as per our submission guidelines duly available on our website under the heading guidelines for submission, at the email addresses: infoijrcm@gmail.com or info@ijrcm.org.in.

GUIDELINES FOR SUBMISSION OF MANUSCRIPT

1. **COVERING LETTER FOR SUBMISSION:**

DATED: _____

THE EDITOR

IJRCM

Subject: **SUBMISSION OF MANUSCRIPT IN THE AREA OF _____.**

(e.g. Computer/IT/Engineering/Finance/Marketing/HRM/General Management/other, please specify).

DEAR SIR/MADAM

Please find my submission of manuscript titled '_____' for possible publication in your journals.

I hereby affirm that the contents of this manuscript are original. Furthermore, it has neither been published elsewhere in any language fully or partly, nor is it under review for publication anywhere.

I affirm that all author (s) have seen and agreed to the submitted version of the manuscript and their inclusion of name (s) as co-author (s).

Also, if my/our manuscript is accepted, I/We agree to comply with the formalities as given on the website of journal & you are free to publish our contribution in any of your journals.

NAME OF CORRESPONDING AUTHOR:

Designation:

Affiliation with full address, contact numbers & Pin Code:

Residential address with Pin Code:

Mobile Number (s):

Landline Number (s):

E-mail Address:

Alternate E-mail Address:

2. **MANUSCRIPT TITLE:** The title of the paper should be in a 12 point Calibri Font. It should be bold typed, centered and fully capitalised.

3. **AUTHOR NAME (S) & AFFILIATIONS:** The author (s) **full name**, **designation**, **affiliation** (s), **address**, **mobile/landline numbers**, and **email/alternate email address** should be in italic & 11-point Calibri Font. It must be centered underneath the title.

4. **ABSTRACT:** Abstract should be in fully italicized text, not exceeding 250 words. The abstract must be informative and explain the background, aims, methods, results & conclusion in a single para. Abbreviations must be mentioned in full.

5. **KEYWORDS:** Abstract must be followed by list of keywords, subject to the maximum of five. These should be arranged in alphabetic order separated by commas and full stops at the end.

6. **MANUSCRIPT:** Manuscript must be in ***BRITISH ENGLISH*** prepared on a standard A4 size ***PORTRAIT SETTING PAPER***. It must be prepared on a single space and single column with 1" margin set for top, bottom, left and right. It should be typed in 8 point Calibri Font with page numbers at the bottom and centre of the every page. It should be free from grammatical, spelling and punctuation errors and must be thoroughly edited.

7. **HEADINGS:** All the headings should be in a 10 point Calibri Font. These must be bold-faced, aligned left and fully capitalised. Leave a blank line before each heading.

8. **SUB-HEADINGS:** All the sub-headings should be in a 8 point Calibri Font. These must be bold-faced, aligned left and fully capitalised.

9. **MAIN TEXT:** The main text should follow the following sequence:

INTRODUCTION

REVIEW OF LITERATURE

NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

SCOPE FOR FURTHER RESEARCH

ACKNOWLEDGMENTS

REFERENCES

APPENDIX/ANNEXURE

It should be in a 8 point Calibri Font, single spaced and justified. The manuscript should preferably not exceed 5000 words.

10. **FIGURES &TABLES:** These should be simple, centered, separately numbered & self explained, and **titles must be above the table/figure**. **Sources of data should be mentioned below the table/figure**. It should be ensured that the tables/figures are referred to from the main text.

11. **EQUATIONS:** These should be consecutively numbered in parentheses, horizontally centered with equation number placed at the right.

12. **REFERENCES:** The list of all references should be alphabetically arranged. The author (s) should mention only the actually utilised references in the preparation of manuscript and they are supposed to follow **Harvard Style of Referencing**. The author (s) are supposed to follow the references as per following:

- All works cited in the text (including sources for tables and figures) should be listed alphabetically.
- Use (**ed.**) for one editor, and (**ed.s)** for multiple editors.
- When listing two or more works by one author, use --- (20xx), such as after Kohl (1997), use --- (2001), etc, in chronologically ascending order.
- Indicate (opening and closing) page numbers for articles in journals and for chapters in books.
- The title of books and journals should be in italics. Double quotation marks are used for titles of journal articles, book chapters, dissertations, reports, working papers, unpublished material, etc.
- For titles in a language other than English, provide an English translation in parentheses.
- The location of endnotes within the text should be indicated by superscript numbers.

PLEASE USE THE FOLLOWING FOR STYLE AND PUNCTUATION IN REFERENCES:

BOOKS

- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio," Ohio State University.

CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

JOURNAL AND OTHER ARTICLES

- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

UNPUBLISHED DISSERTATIONS AND THESES

- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

ONLINE RESOURCES

- Always indicate the date that the source was accessed, as online resources are frequently updated or removed.

WEBSITE

- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on December 17, 2011 http://epw.in/user/viewabstract.jsp

EFFECTIVE MAINTENANCE MANAGEMENT IN PETROCHEMICAL INDUSTRIES

N. K. K. PRASANNA
SR. VICE PRESIDENT
RELIANCE INDUSTRIES LTD.
HAZIRA

TUSHAR N. DESAI
ASSOCIATE PROFESSOR
DEPARTMENT OF MECHANICAL ENGINEERING
S. V. NATIONAL INSTITUTE OF TECHNOLOGY
SURAT

ABSTRACT

Traditional view of the general public towards maintenance is an unavoidable activity that costs money and takes time. To greater extent this view was matching with the view held in board rooms of Industry 20 -25 years before. People used to think of maintenance when things used go badly wrong. The moment there is a safety or environmental incident the people use to talk about gaps or cutback in maintenance. But slowly things have changed, not only industry but general public also started talking about maintenance needs, life cycle costing and effect of not doing maintenance on business. It is very good sign for a maintainer and a pride for each one who is in the field of maintenance. When we do business we manage risk of safety incidents, environmental incidents, loss of efficiency poor productivity or loss of image in the market. The Maintenance Management particularly in Petrochemical Industries plays a vital role in managing the risks related to safety and environment. The paper deals with the role of Effective Maintenance Management in managing such risks.

KEYWORDS

Efficiency, Effectiveness, Preventive Maintenance, Predictive Maintenance, Proactive Maintenance, Corrective Maintenance, Reliability Centered Maintenance, Mean Time Between failure, Mean time to failure.

INTRODUCTION

Effective maintenance is one of the most cost effective methods for ensuring the reliability, safety and energy efficiency in process industry. Good maintenance practices not only ensure availability but achieve safety, reliability and aesthetics also. Through effective maintenance improvements can be seen in the performance of assets and this can be achieved immediately and at a relatively low cost. Maintenance is the decision and actions regarding the control and upkeep of property and equipment. These are inclusive, but not limited to the following actions 1) actions focused on scheduling, procedures, work/system control and optimization; and 2) performance of routine, preventive, predictive, scheduled and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability and safety. Maintenance Excellency represents the life cycle, cost effective mix of preventive, predictive and reliability centered maintenance technologies, coupled with equipment calibration, tracking and Computerized maintenance management capabilities all targeting reliability, safety, occupant comfort and system efficiency.

Asset Management has three purposes:

- To prevent and eliminate the failure of facilities, plant and equipment
- To minimize and eliminate risk in the use of facilities, plant and equipment
- To optimize value from the use of facilities, plant and equipment.

Five important issues which prevent the achievement of these three purposes-variability in process ,prevention of failure, risk control, accuracy control and process value contribution-which unless their effects and impacts are understood and completely controlled will continuously prevent organizations achieving success in asset management.

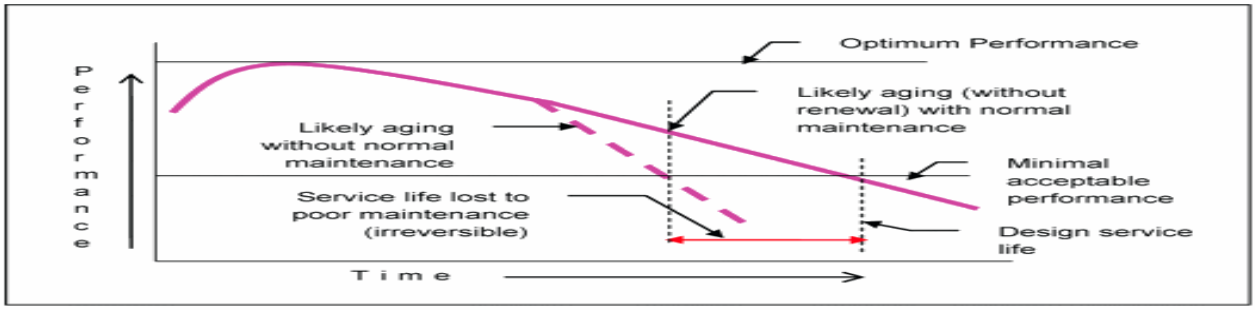
The markets of the early twenty first century are more niches focused and segmental than those of the previous century. The impact on business of many small markets means that new business opportunities can rise, mature and disappear within three to five years. Manufacturing must respond to the shortening of product life cycles by ensuring their plant and equipment is run effectively and efficiently from the start of product life.

Efficiency in general describes the extent to which time or effort is well used for the intended task or purpose (It is a measure of how economically the firm's resources are utilized when providing a given level of requirements). Effectiveness means capability of producing an effect and is more frequently used in connection with the degree to which something is capable of producing a specific desired effect. In management effectiveness relates to getting the right things done (The accomplishment of the right thing on time, and within the quality requirements specified).

Many methodologies such as Total Productive Maintenance, Root cause Failure analysis, Failure Mode Effect criticality Analysis, Risk based inspection were used specially in response to the need to remove the causes and cost of defects and failure demanded by the effective asset management. New technologies in predictive maintenance and condition monitoring have allowed machines' condition to be monitored and determine how they can most optimally be used and maintained, and to tell the operators of impending problems before production is affected. Effective utilization of asset is a condition for business prosperity and effective operation and maintenance is the only way to ensure better utilization.

The following figure (figure 1) depicts effect of adequate and timely maintenance and repairs on the service life of a equipment.

FIGURE 1: EFFECT OF ADEQUATE AND TIMELY MAINTENANCE AND REPAIRS ON THE SERVICE LIFE OF A EQUIPMENT



RISK IN BUSINESS

Survival and prosperity decide the success of any business activity. Risk is inherent in all the tasks we undertake. So also with the business activity, no one likes to meet adverse effects while taking some risks, particularly the non speculative or pure risks. Such risks, which involve loss, include

- Physical harm to employees
- Property damage to organization
- Physical harm or property damage to public
- Capital loss
- Security loss

In order to reduce risk, the potential hazards that are likely to result in loss are to be eliminated or controlled to the possible extent. To decide on the loss control approaches, the hazards are to be identified. Hazard as relates to "Accident" is defined as the potential for causing harm to persons, damage to property or environment degradation. Hazards are due to transfer of energy in one form or other and if the energy transferred is more than the withstanding capacity at the receiving end, hazard is created. The hazard identification is essential for

- Statutory compliance
- Minimize loss exposure and risk
- Better safety Management

Hazard Identification techniques are as follows:

Reactive approach

- Accident Investigation
- Plant Inspection
- Critical Incident Technique
- Incident recall Technique

Proactive Approach

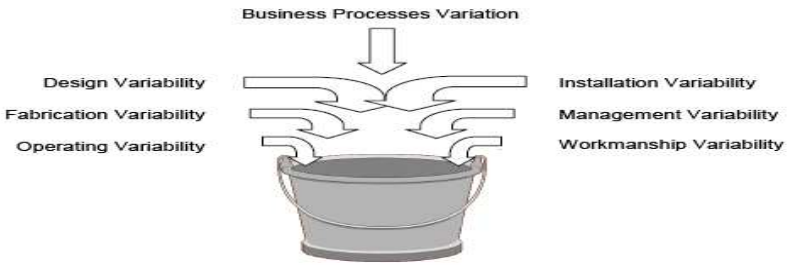
- Job safety Analysis
- Failure Mode Effect Analysis
- Hazard operability Study
- Fault Tree and Event Tree Analysis
- Management Oversight Risk Tree Analysis
- Fire Explosion and Toxicity Index
- Material/Chemical Reactive Analysis
- Consequence Analysis

Effective Maintenance Programme plays a vital role in hazard control and risk minimization.

EFFECTIVE MAINTENANCE

The following figure (figure 2) depicts DuPont defect and failure model. It highlights some of the many processes where failure causing defects and errors come into a business.

FIGURE 2: DUPONT DEFECT AND FAILURE MODEL



Failure: Failure is the inability of equipment, a sub-system, or system to meet a set of predetermined performance standards.

Failure Rate: The total number of failures within an item population, divided by the total no of life units, during a particular measurement interval under stated conditions.

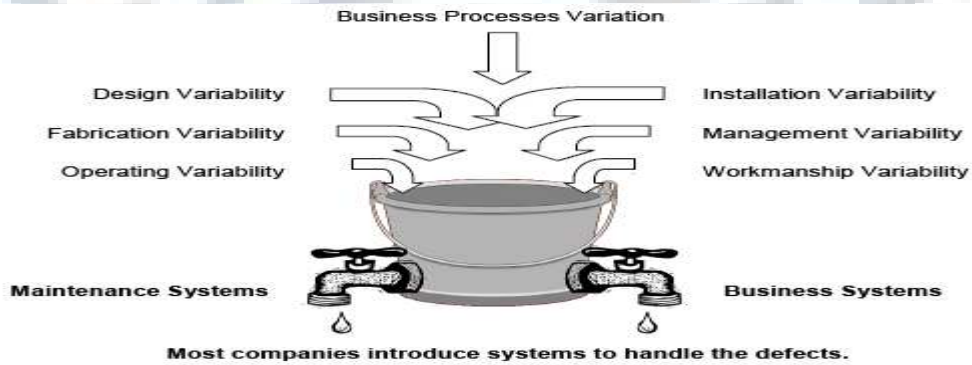
Mean time between Failures (MTBF): A basic measure of reliability for repairable items. Then mean number of life units during which all parts of the item perform within their specified limits, during a particular measurement interval under stated conditions.

Mean Time to Failure (MTTF): A basic measure of reliability for non-repairable items. The total number of life units of an item divided by the total no of failures within that population, during a particular measuring interval under stated condition.

Reliability: The probability that an item can perform its intended function for specified interval under stated condition.

The following figure (figure 3) depicts the general attitude of companies towards defects. They accept defects as normal and introduce maintenance and repair systems to manage the failures.

FIGURE 3: DEFECT MANAGEMENT BY MOST COMPANIES



Maintenance: As discussed in the introductory part in the past maintenance practices both in private and Government sectors would imply that maintenance is the actions associated with equipment repair after it is broken. No Sector in developing nation can afford this thinking or practice in the present scenario of globalization and competitiveness. The dictionary defines maintenance as follows "the work of keeping something in proper condition; upkeep."This would imply that maintenance should be actions taken to prevent a device or component from failing or to repair normal equipment degradation experienced with the operation of the device to keep it proper working condition .Maintenance is the combination of all technical and associated administrative actions intended to retain an item in or restore it to, a state in which it can perform its required function. Maintenance function as defined by Maintenance Engineering Society of Australia (MESA) is "The Engineering decisions and associated actions necessary and sufficient for optimization of specified capability". Where capability is the ability to perform a specified function within a range of performance levels that may relate to capacity, rate, quality and responsiveness. Maintenance concept is set of various maintenance interventions (Corrective, preventive, condition based, etc) and the general structure in which these interventions are brought together. Maintenance Management is "Activities of Management that determine the maintenance strategy, objectives, and responsibilities and implement them by means such as maintenance planning, maintenance control, and supervision, improvement of methods in the organization including economic aspects.
Maintenance is not merely preventive maintenance, although this aspect is an important ingredient .Maintenance is not lubrication, although lubrication is one of the primary functions. Nor is maintenance simply a frenetic rush to repair a broken machine part or a building segment, although this is more often than not the dominant maintenance activity.
In a more positive vein, maintenance is a science since its execution relies, sooner or later on most or all of the sciences. It is an art because seemingly identical problems regularly demand and receive varying approaches and actions .An important element of Effective Asset Management is effective maintenance
Before we discuss Effective Maintenance in detail let us comeback to Asset Management and important issues which prevent achievement of the purpose of effective asset management program.

a) **Variability in Business and operation processes:** Variability causes most operating and business problems. Any business with an aim of providing a product or services with consistent specifications and properties does not want its processes producing out –of-specification merchandise .Out of specification performance is waste of money, time and effort.

Six Sigma: Like all innovations, Six Sigma had the perspective of the great thinkers of manufacturing and production. Although the concept originated with a group of Motorola Engineers during the mid -1980s Six Sigma includes the theory and logic of quality pioneers such as W.E. Deming Joseph Juran and Philip Crosby to address the age old question: Is the effort to achieve quality dependent on detecting and fixing defects? Or can quality be achieved by preventing defects through manufacturing controls and product design?
Six Sigma is a problem solving Technology that uses human assets, data, measurements and statistics to identify the vital few factors to decrease waste and defects while increasing customer satisfaction, profit and shareholder value.

b) **Failure Prevention:** Proactive defect elimination and failure prevention is a most effective variability control methodology for reducing plant and equipment downtime. The best way to fix a problem is not to have it. Failure is an event or circumstance which prevents the accomplishment of an intended purpose. An unplanned machine stoppage or a customer getting their delivery a day late are both failures. Each has consequences on the organization. The equipment failure means lost production, unwanted repair and consequential knock on costs. Reliability Engineering plays a vital role in failure prevention.

c) **Risk control:** Risk exists in everything we do. Risk is the chance or possibility of loss. It is combination of two elements –the frequency, or probability of the occurrences of a specified event with the consequence should the event happen. The challenge is to develop methods to increasing the likelihood of good outcomes while addressing and mitigating the bad. Equipment criticality is a risk indicator.(Equipment Criticality =Risk=Failure Frequency X cost consequence)and it is used to identify operating equipment in priority order of importance to the continued operation of a facility. Those equipments that stop operation or cause major costs if they fail are identified as critical. Higher quality engineering design, better materials selection and more demanding levels of maintenance and operator precision and care are given to those items to maximize their level of availability and benefits for production.

d) **Accuracy Control:** Great SOP's/SMP's are those that ensure work and workmanship quality, but do not necessarily need only qualified people to do them. They are written with more detail and guidance and include a target to hit .a tolerance on accuracy and regular proof-tests of compliance so that job quality is guaranteed. By this way of accuracy control, defects are prevented from arising and future failures are prevented.

e) **Value contribution:** Enterprise Asset Management is as much about the wise use of money as it is about the wise use of engineering, maintenance, and operational management to deliver top performance from production equipment and processes. A business should be viewed as a system for supplying the customer's requirements effectively and efficiently. This requires an ongoing commitment to continually improve and tune the organization to be more efficient and do its functions faster, better and cheaper.

The purpose of most equipment in a production process is to support the production of product destined to downstream customers. Equipment performance is associated with quality, availability, cost/unit, safety and environmental integrity. To achieve this performance there are three inputs to be managed.

- Process Technology-provides capable equipment "by design" to meet the equipment performance
- Operating Practices –make use of the inherent capability of process equipment
- Maintenance Practices –that maintain the inherent capability of the equipment

The objectives of an "Effective Maintenance' programme are

- Support operations by keeping production equipment in good condition so that production targets can be met.
- Maintain the plant facilities by keeping the plant site and its buildings, utilities and grounds in a functional attractive state.
- Perform quality work.
- Anticipate and prepare for future work
- Achieve continued improvement by evaluating performance, taking corrective actions and measuring progress.
- Ensure statutory regulations are met in addition to availability.

Effective Maintenance has its foundation in Best Maintenance Practices. Those practices include the following areas

- Leadership and Policy deployment
- Organizational Structure
- Inventory control
- Computerized Maintenance Management systems
- Preventive Maintenance
- Predictive Maintenance
- Corrective Maintenance
- Proactive Maintenance
- Reliability Centered Maintenance
- Planning and Scheduling
- Work Flow
- Financial Control
- Operational Involvement
- Staffing and Development
- Continuous Improvement

- Purchasing
- Accountability

Leadership and Policy Deployment: Effective Maintenance relies on leadership providing direction, focus and support .This involves management establishing a clear mission and vision supportive of the organization's direction and goals. Leadership also responsible for establishing the policies and expectations that serves to guide maintenance and the total organization in supporting maintenance activities.

Organizational Structure: Maintenance Organizations function at three major levels: organizational level (Functional and structural relationships), process level (Work activities) and job performer level (Individual worker). The ineffectiveness of one level could negatively impact another level. For example poorly defined work activities, such as the lack of planning and scheduling, can hinder an individual's performance and attitude.

Inventory Control: Maintenance is closely associated with materials and its management. The analysis of financial statements of large no of companies indicates that 60% of the total expenditure is on materials, any efforts made to optimize cost in this area go a long way in improving the profitability of the company. For a maintenance man inventory means spare parts, lubricants and other consumables Maintenance managers along with material department in charge are responsible for necessary stock, re-ordering, receiving, inspection and storage.

Computerized Maintenance Management Systems: A computerized maintenance management system is a software which supports in managing maintenance activities like work order generation, prioritization, history capturing, PM Schedules, Inventory management etc.

Preventive Maintenance: Preventive Maintenance is often defined as "those timed or meter –based service activities used to extend the life of equipment and identify potential problems through inspection and early detection"

Preventive Maintenance includes work performed on selected equipments like inspection, cleaning, testing, lubrication efforts and scheduled shutdown services. PM is a major component in moving from reactive to proactive through early detection and correction.

Predictive Maintenance: Predictive Maintenance is the application of Technologies and early detection processes to monitor and detect changes in condition to allow more precise intervention. It includes vibration analysis, shock pulse methods, ultrasonic, thermographic analysis, electrical surge comparisons, coolant analysis, wear particle analysis and performance trending.

Corrective Maintenance: PM tasks are implemented before a problem is evident and corrective tasks are scheduled to correct specific problem that have been identified in plant system The fundamental objective of this approach is to eliminate breakdowns, deviations from optimum operating condition and unnecessary repairs and to optimize the effectiveness of all critical plant systems..

Proactive Maintenance: Proactive Maintenance is a term to identify the enhancement of both the preventive and predictive maintenance technologies. It is absolutely necessary that managers identify and document data gained from both the PM and PdM programs so that they can develop the PAM portion of the equitation. The PAM will provide managers a vehicle to effectively create a reduction in total maintenance downtime while maximizing equipment production reliability and useful life.

Reliability Centered Maintenance: Reliability Centered Maintenance is a rigorous, highly structured approach to work identification.RCM can go beyond maintenance program development by including failure modes addressing causes of human error and design deficiencies. When these are included RCM produces the following outcomes:

- Maintenance programs evaluated on Technical feasibility and worth doing.
- Recommendations addressing changes to standard operating and Standard Maintenance Practices.
- Operational and Maintenance training recommendations.

The RCM process requires answers to the following seven questions:

- What are the functions of the asset in its present operating context?
- In what ways can it fail?
- What causes it to fail?
- What happens when it fails?
- Does it matter if it fails?
- What can be done to predict or prevent the failure?
- What can be done if you can't predict or prevent the failure?

Planning and Scheduling: Planning is devising a process for doing, making or arranging maintenance work. It involves preparing job plans and other resources to enable the craftsperson to perform the work quicker and more efficiently. It often deals with the "What" and "how"

Scheduling is creating a schedule for when the work is to be performed. Scheduling deals with the "When" and "Who".

The majority of maintenance work can be planned and for the most part, should be. Increasing productivity or value –added work of maintenance personnel depends a great deal on properly planned activities.

Work Flow: Work order is an integral part of an effective maintenance operation. It serves to the following

- Identify work
- Request work
- Prioritize work
- Schedule work
- Track work
- Analyze work

This process is to control and monitor activities and most significant purpose is to analyze work that has been performed, identify costs, losses, and trending problems.

Financial Control: This includes fiscal control procedures of the maintenance organization. It includes budget control, contractor cost monitoring, and overall labor and material cost control.

Operational Involvement: It is becoming rarer to find organizations that have not broadened their level of operator involvement in basic care type activities. This may be in the form of "Total Productive Maintenance" or some other structured process to encourage ownership, involvement and improve equipment reliability.

Staffing and Development: To support the "new" maintenance organization ,jobs will have to be redefined to improve efficiency and effectiveness .Traditional views of restrictive job requirements and duties will have to be replaced with more flexibility and higher level skills.

Training and skill development is a key component as it enables people to meet the expectations that face in their challenging jobs.

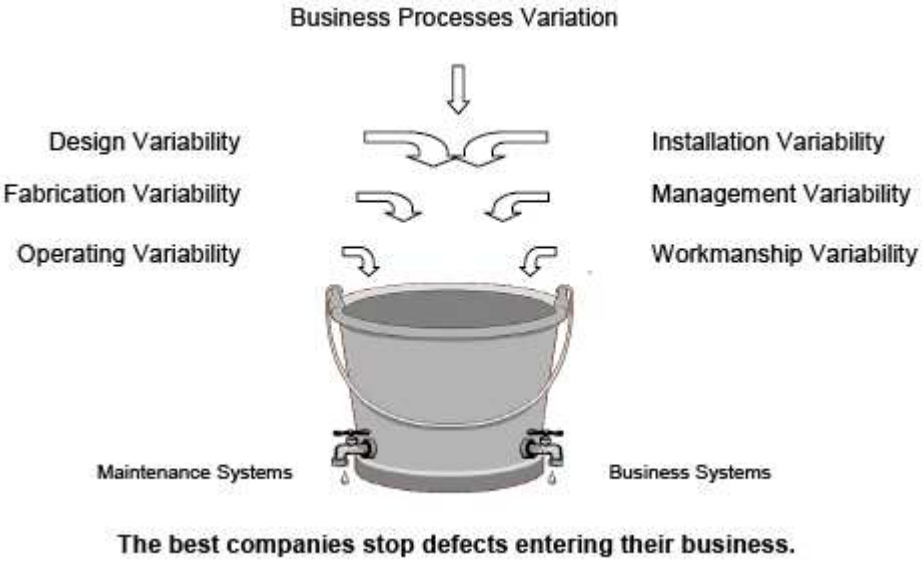
Continuous Improvement: Continuous Improvement is best described as constantly striving for better ways to do things. It is creating discomfort with the status quo and striving towards excellence through small incremental change.

Purchasing: Purchasing also plays an important role in integrated effective maintenance organization. Stock levels considering the consumption pattern, supply lead time and usage with adequate planning prevent stock outages. Automated system to trigger purchase request based on predefined reorder level makes the system more effective.

Accountability: Accountability is required and must be built in to the system. Individuals and groups assigned need to be specially challenged so that the drive is in the proper direction. Activities need to be charted along with the development of detailed plans and how they have impact on the key measures. The indicators are then used to highlight the success of the plan and serve to reinforce those actions taken.

Figure 4 depicts the best strategy to prevent defects entering the business. As a consequence, maintenance costs reduce, production downtime falls, and there is increase in equipment reliability, plant availability and productivity.

FIGURE 4: DEFECT ELIMINATION



CONCLUSION

The author is closely associated with maintenance field since last 27 years in Fiber and Petrochemical Industry. The need of the hour is effectiveness and definitely it can be achieved by following the best practices as discussed above. Risk identification, mitigation plan is very much essential to make a job safe and successful along with planning, scheduling and control. Poor planning, improperly trained staff, unclear goals and objectives ,lack of leadership, poor historical records and inefficient manning can cause work to take longer, cost more, and produce poor results. This outcome is an organization that is inadequately postured to compete effectively.

Good Maintenance practices enable maintenance men to take care of the assets and to maintain them AGAN (As good as new).

ABBREVIATIONS

PM	Preventive Maintenance
PdM	redictive Maintenance
PAM	Proactive Maintenance
MTBF	Mean Time Between Failures.
MTTF	Mean Time To failure
RCM	Reliability Centered Maintenance.

REFERERENCES

1. Effective Maintenance Manangement by Mr. V .Narayan-Industrial press, New York-2004.
2. Operations and Maintenance Best practices-A guide to achieving operational Excellency. Release 3.0 August 2010.US Department of Energy, Federal Energy Management Program. Mr. G.PSullivan, Mr.R.Pugh, Mr.A.P .Melendez and Mr.W.D Hunt.
3. Idustrial Safety and Risk Management by Mr. Nedumaran Assistant Professor Department of Chemical Engineering Sri.Venkateshwara College of Engineering Sriperumbudur India October 8, 2004.
4. www.leanexpertise.com-articles on Total Productive Maintenance.
5. Maintenance Engineering Handbook 7Th Edition. R. Keith Mobley
6. Cost effective Maintenance for competitive advantages.School of Industrial Engineering, Sweden.2004.
7. www.trimitra.com/artcles/maintenancepractice.html
8. www.maintenanceworld.com. GW.Lloyd and J.L.Grinder
9. Materials Management, an integrated approach By Mr. P .Gopalakrshnan and Mr. Sundaresan.Fifth Edition 1984 July.
10. Advanced Quality Management Philosophies and Techniques.
11. Short Term Training Programme.SVNIT, 2010 Jan. Transforming an ISO9000:2000 Enterprise to Six Sixma Level

REQUEST FOR FEEDBACK

Dear Readers

At the very outset, International Journal of Research in Commerce, IT and Management (IJRCM) acknowledges & appreciates your efforts in showing interest in our present issue under your kind perusal.

I would like to request you to supply your critical comments and suggestions about the material published in this issue as well as on the journal as a whole, on our E-mails i.e. **infoijrcm@gmail.com** or **info@ijrcm.org.in** for further improvements in the interest of research.

If you have any queries please feel free to contact us on our E-mail **infoijrcm@gmail.com**.

I am sure that your feedback and deliberations would make future issues better – a result of our joint effort.

Looking forward an appropriate consideration.

With sincere regards

Thanking you profoundly

Academically yours

Sd/-

Co-ordinator