

# PREVENTIVE MAINTENANCE AND BREAKDOWN REDUCTION OF CRITICAL MACHINES

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**Abstract:-** Preventive maintenance, routine inspection and service companies are designed to detect possible error conditions and make major adjustments or repairs that help prevent major problems in the industry. Until they do not work. An effective maintenance program for preventive equipment requires properly trained personnel, regular inspections and service, and must maintain regular records. It is expected that it will not interfere with normal operations, and therefore does not remain stationary for the equipment. Maintenance stops normal operations and machinery and operators are available until the equipment is returned to normal working conditions. Interrupt maintenance is the recovery that is usually performed after the equipment has reached its state. This is often an emergency situation involving a penalty for the acceleration of maintenance costs and capital costs of equipment. Preventive maintenance will reduce costs to one point. In addition, the charge of preventive maintenance will be higher than the economic downturn. In such a situation, an option of the company can choose maintenance.

## I. INTRODUCTION

A large capital investment in a manufacturing or service sector predicts sufficient returns through equipment. Such expectations will be true when the equipment performs its normal functions. Often, the equipment supplier's maintenance plans do not relay the required output and endurance units. Therefore, it will sometimes be necessary for proper equipment maintenance to achieve the obligatory levels of product or service. When the maintenance system is well organized, the benefits of the organization are:

- ❖ Minimization of Equipment's dejected time
- ❖ Upsurge availability of the total system
- ❖ Augmentation of equipment's productive lifetime
- ❖ Nontoxic working environment to the men.

When the equipment is part of a production system, it can be very expensive because it can shut down the entire production system. By taking appropriate maintenance plans, this will also reduce the wear resistance of the

equipment. Sometimes worker safety can be the most important. In this case, proper preventative maintenance will ensure their safety. For example, every plane must first be inspected and fly later to ensure safety the passengers.<sup>7</sup>

## II. RELATED WORK

Performance goals are defined as the process of quantifying the effectiveness and effectiveness of past and future activities. Important issues in this area are those measured and measured in a practical and advantageous manner. Performance measurements can provide the status of variables, compare data with shots or standard data, and indicate what actions should be taken and should be used as corrective and preventive actions. Performance measurement is an absolutely important management element in the management organization's opposition to improvement, control of progress, and focus on planning objectives. *Amaratunga and Baldry (2003)* define the performance as a process to assess the achievement of predetermined goals, including the progress of information on the efficiency of the conversion of resources into goods and services, the quality of these products, and the performance and efficiency of the organization's goals. Anderson and Fagerhaug (2002) pointed out that the reasons used to measure performance, such as employees provide information on what to do to help management make the right decision-making; help implement the organization's best strategies and strategies, and use performance measurement data to Track performance trends over time.

Performance measurement is considered an important management tool that can help determine the success or failure of these two organizations and their performance (Pintu et al., 2007). It is the language of progress and gives us the ideas and - most importantly - where to go (Bhagwat and Sharma 2007). Performance goals include basic performance indicators in the company and filling in it for each dimension can perform specific calculations (Unahabhokha et al., 2007). The performance evaluation of the process includes the basic mapping of the process, performance evaluation, Performs reasonable source analysis and performance benchmarking (Kobaccy and

Murthy 2008).

### III. MAINTENANCE COSTS

Equipment failures lead to production losses, high emergency maintenance costs, delays in production plans, and staff and machines that are out of work. As indicated by the distribution costs, the total cost of preventive maintenance, including inspection costs, service costs and planned repairs up to point M, is often exceeded. In addition to this optimal point, the level of preventive maintenance is becoming higher and it is economically unreasonable. It is economical to adopt an error recovery strategy. The optimum level of maintenance activity M is easily determined on a theoretical basis and it is therefore necessary to know the facts of the charges associated with malfunction and preventive maintenance. The different costs maintained include:

1. Interruption (Idle time cost) charge due to equipment failure.
2. Price tag of spares or additional material used for maintenances
3. Charge of maintenance labour and outlays of maintenance sections.
4. Fatalities due to inefficient processes of machines.
5. Capital money required for equipment's replacement.

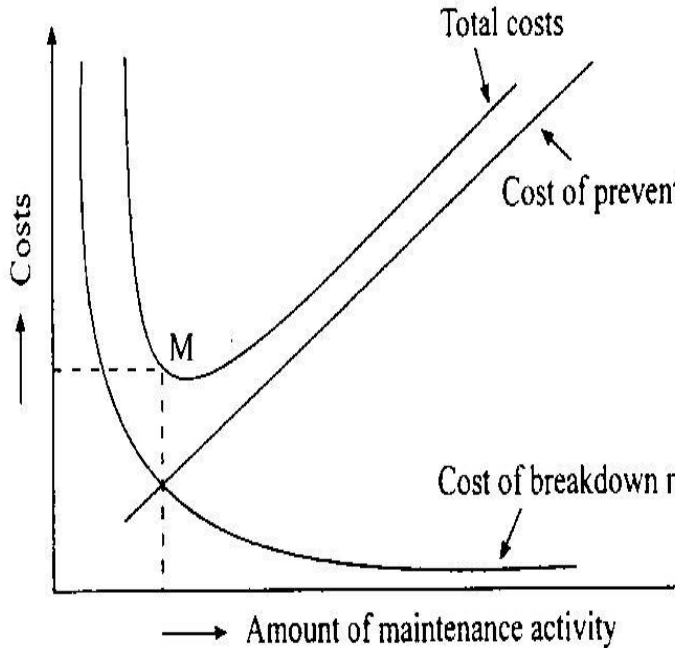


Figure 1:-Maintenance Cost Breakdown

### IV. METHODOLOGY OF WORK

Compile and study the initial set of hardware error details, ie error time, malfunction, MTTR, MTBF, and other data. Select the main machine, "Shot Blast & Cold Swage" for analysis. Examine the type of error and repeat the error frequently. Follow the breakdown reduction method.

- ❖ Perform an analysis of the main reason for reducing the occurrence of errors.
- ❖ Perform the analysis of how much WHY-WHY analysis..
- ❖ Substitute the defective part of the machine.
- ❖ Implementing the corrective steps.
- ❖ Monitoring and verifying the results breakdown occurrence, MTTR, MTBF are

This section describes the ideas and significance of maintenance in a production environment. Both types of maintenance - detailed instructions for malfunction and scheduled maintenance. The purpose of the maintenance work must be A balance between ease of use and overall operating costs. 8 also discusses the ability to replace equipment to ensure its normal performance. This chapter also discusses two types of alternative technologies that are used to determine the best alternative strategies for projects that have deteriorated over time and that these strategies do not decline but fail unexpectedly.

These models will be discussed according to parameters Like the maintenance costs and the time value. The crankshaft is a big part of the engine with a complex geometry. The 4-way torque switch converts the reciprocal displacement of the piston into a rotational movement. Because the crankshaft undergoes a great number of burden cycles during its life, the performance and durability of fatigue must be taken into account during the design process. Design development has always been a major problem in the crankshaft manufacturing industry to produce cheaper parts with minimal weight and adequate fatigue asset and other functional necessities. These enhancements make the engine lighter and smaller, more fuel efficient and more powerful.

This survey was conducted on a one-cylinder four-stroke engine. In this study, two different crankshafts of similar engines were studied. Each crankshaft performs the final elemental analysis in four static steps. Stresses from these examines were recycled for superposition with favours to Static load applied to the

crankshaft. Further analysis was performed on the forged steel crankshaft in demand to Enhance the load and industrial cost.

#### **V. FUNCTION OF CRANKSHAFTS IN IC ENGINES**

The crankshaft, connecting rod and piston form a four-beam sliding mechanism that converts the sliding movement of the piston (slider in the mechanism) into a rotational movement. Since the rotation output is more convenient and useful for inputs from other devices, the design of a motor is that the output will be rotatable. In addition, the linear displacement of a machine engine is not good, as the displacement is instigated by the ignition of gas in the burning chamber. Consequently, the displacement has unexpected shocks and exhausting this input for additional device may reason injury to it. The idea of consuming crankshaft is to alteration these unexpected displacements to a plane rotary output that is the input to numerous devices such as pumps, generators, and compressors. It should also be declared that the practice of a flywheel helps in flattening the shocks. The mounting of a crankshaft in an engine and the P-V diagram during an engine cycle for a four stroke cycle engine, where  $V_d$  is the volume swept by the piston and  $V_{bdc}$  is the volume of the cylinder when the piston is at the bottom dead centre(BDC).

#### **VI. SERVICE LOADS AND FAILURES EXPERIENCED BY CRANKSHAFTS**

The crankshaft experiences great forces in the combustion of gas. This force is applied to the top of the piston and because the connecting rod connects the piston with the crankshaft, the power is transferred to the crankshaft. The magnitude of the force depends on many factors which consists of crank radius, attaching rod dimensions, weight of the connecting rod, piston, piston rings, and pin. Combustion and inertia forces performing on the crankshaft reason two natures of loading on the crankshaft structure torsional load and bending load.

There are many sources of failure in the engine. They could be categorized as mechanical, operating sources, and repairing sources (Silva 2003). One of the most common crankshaft failures is fatigue at the fillet areas due to bending load caused by the combustion. Even with a soft case as journal bearing contact surface, in a crankshaft free of internal flaws one would still expect a bending or torsional fatigue crack to initiate at the pin surface, radius, or at the surface of an oil hole.

Due to the crankshaft geometry and engine mechanism, the crankshaft fillet experiences a large stress range during its service life. Crankshaft in the engine block from can be realized that at the moment of combustion the load from the piston is transmitted to the crankpin, causing a large bending moment on the entire geometry of the crankshaft. At the root of the fillet areas, stress concentrations exist and these high stress range locations are the points where cyclic loads could cause fatigue crack initiation, leading to fracture.

#### **VII. RESEARCH METHODOLOGY**

##### **A. The following methodology is adopted in the research**

1. Through the literature and current practices of the industry, study general maintenance and malfunctions, especially machines used in the construction industry. The literature overview also focuses on history, development and trends in maintenance management.
2. breakdown maintenance for the renovation of building materials in the industrial sector has been collected over the years from 2007 to 2011. Discuss the first information on price reductions and other equipment failures.
3. Research employees at all levels of different companies to determine the requirements for building materials in the area.
4. Investigate the impact of high costs, inequality and corruption and reduce the percentage of components used to detect equipment that has caused the greatest damage to the industry. This survey is based on the calculation of L (L), Mean Time (MTBF), Time-Time (MTTR), presentation and evaluation of the structure and components of the basic components that have been created. Facts.
5. Systematic identification of the breakdown codes for the construction .

##### **B. Machinery is performed with following tools**

Result Discovery: When the program was activated, the system components at record level in



2007-2011 could not reach the so-called BSC root (numbers) and bugfixes (BMC)

**Pareto analysis**:: this tool is used to identify the large numbers that cause major damage.

Failure Mode Effect Analysis (FMEA): it is used in this way with BMC BSC (Pareto determined by the survey) to study the effect of these numbers on system components. The most influential BSC study was detected. Error Tree Analysis (FTA): the error with the symptoms and causes of BSC that have been determined to be promoted is called Error Cause Code (BScC) Error Code (BRC).

6. Follow all failed BMPs based on BMC, BSC, BScC and BRC.

7. BMP (small circle) is designed to assist BMP designers in treating conditions.

8. New products based on administrative management (MUMM)

The survey has been designed.

Research into imbalance has been reported before and after the MUMM model.

#### **VIII. BREAKDOWN MAINTENANCE MANAGEMENT (BMM) MODEL**

This is very easy to use for BMM products, two important elements, namely details. For dumpers and wheelchair users, the highest price for the disease is highest (6,338 dirhams / 3 898 dirhams per hour), both gearboxes. Almost 61% of the device's down time is in the range of 7 to 10 hours. Snowflake spreads land and land, removes dirt, loads and transports trucks to other vehicles. If there is a problem with this device, we can get a full website service. In the absence of equipment, it will be very serious to reduce the results. Dumpers are industrial machines, including building materials such as crude oil, blocks, castings, machines and tools. They also excrete the dirt from the cabin to improve and distribute the hot water that is filled with cold water. The 1 hour interval will have a major impact on what has happened. It also shows how it evolved. The MUMM model has three submodels: translation analyzer, BMP identifier and BMM analyzer. Handy tools to find search results found in a single FOUR query, Other Error Statistics (BMC), Subscription Subscriptions (BSC), Codex Promotional Release (BSYC) and Code Debt (BRC). The BMP section was determined. This helps to generate resources that need to be adjusted and repaired to be repaired. BMP ruler BMP ruler helps you find it. The following principles are influenced by the reported reports. The MUMM research model is in line with the repair process before BMM technology is used. Activities and related methods include;

1. Work-Exercise Results (CEA) helps to identify, spread and show a particular disease or behavior. It is used to understand many things that can help with the different types of behavior that can occur on the device.
2. The time limit definition (MTBF) is the basic norm for good things.
3. Time-saving schedule (MTTR), that is, the time to change all changes due to the redemption amount.
4. Ensure that another article is capable of completing the required work in the long term.
5. Discussion changes are a form of use that is as efficient as possible, where the benefits of each degree are estimated from an efficiency and efficiency perspective and the most relevant / specific services are selected to benefit as much as possible. The research on the Arabian peninsula aims to show that there is a good framework for managing almost all buildings.

#### **IX. CONCLUSION**

The main purpose of this paper is to reduce the estimated time of inactivity of PM through the terminology of management tools and technologies to correlate with previously defined

standards. Therefore, it is possible to simplify the main purpose of the PM calendar. Based on the collected data, you can study the error patterns based on the time of inactivity last month. As a result, critical downtime in the cluster has received more attention and is analyzed through maintenance management tools and techniques. This should help reduce downtime and return to the company's facilities.

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