

Maintenance Strategies**Estrategias de Mantenimiento**

FERNÁNDEZ, Tomás†*, MIRANDA, Francisco and ROCHA, Elpidio

ID 1st Author: *Tomás, Fernández*

ID 1st Co-author: *Francisco, Miranda*

ID 2nd Co-author: *Elpidio, Rocha*

DOI: 10.35429/JES.2021.9.5.1.7

Received July 11, 2021; Accepted December 30, 2021

Abstract

Maintenance means keeping equipment running or restoring it to operating condition. However, the 21st century will usher in a broader need for equipment management, a cradle-to-grave strategy to preserve equipment functions, avoid the consequences of failure and ensure the productive capacity of equipment. Profitable future operations will have reduced the 35% of operating costs typically spent on maintenance and the unfavorable impact of downtime that often multiplied these costs by 300%. They will survive those operations that tried to carry outdated “maintenance” thinking beyond the XXI Century.

Maintenance, Industries Generation, Administration of equipment

Resumen

El mantenimiento consiste en mantener los equipos en funcionamiento o restablecer su estado operativo. Sin embargo, el siglo XXI marcará el comienzo de una necesidad más amplia de gestión de equipos, una estrategia de principio a fin para preservar las funciones de los equipos, evitar las consecuencias de los fallos y garantizar su capacidad productiva. Las operaciones rentables del futuro habrán reducido el 35% de los costes de explotación que se suelen gastar en mantenimiento y el impacto desfavorable de los tiempos de inactividad que a menudo multiplican estos costes en un 300%. Sobrevivirán a las operaciones que intentaron llevar el pensamiento anticuado del "mantenimiento" más allá del siglo XXI.

Mantenimiento, Generación de industrias, Administración de equipos

Citation: FERNÁNDEZ, Tomás, MIRANDA, Francisco and ROCHA, Elpidio. Maintenance Strategies. Journal-Economic Systems. 2021. 5-9: 1-7

*Correspondence to the Author: (email: fernandez_gt@yahoo.com)

† Researcher contributing as first author.

Introduction

The objective of this work is to provide ideas and to propose how maintenance strategies would be carried out in the sugar maintenance strategies, as well as the steps to be as well as the steps to be applied in a continuous continuous improvement, the stages of the life cycle of the equipments the stages of the life cycle of the equipment to form a competitive competitive maintenance, as well as the strategies that can be and can be applied and carried out in relation to the maintenance of the equipment.

The maintenance operations of survival should be operations should be applied to modern management techniques and management techniques, and to the current and current technologies, and it is also required that the that the personnel be trained to provide solutions to the to meet the needs of the equipment. Managers of the future will have to use the equipment maintenance management as an integral as an integral part of a total production total production strategy.

Development

This work is based on practical work carried out in sugar mills where it was implemented and carried out, to date these maintenance strategies continue to be implemented since it is a long-term work and in which the maintenance has to be carried out. culture change in the operating and maintenance staff and this is very complex to bring to a successful conclusion.

Not so long ago, in the past, the local heroes in the industries was, the foreman, in charge of maintenance. He was in charge of maintenance operations and disasters that occurred, and he was also in charge of starting up the equipment. These factors meant that omissions when disasters occurred were never questioned. Managers had little time as maintenance was running.



Figure 1

Many managers designated business units to control operations and maintenance. Through this, they provided hermetic control to the maintenance functions, those new designs of leading business units liked to have maintenance and manual personnel. But they find the burden of various activities, such as rebuilding components, etc.

Business unit leaders are also caught looking at measures of increased production. Through this, little was improvised to understand the functions that make maintenance work properly. The experience the managers took was, a delegated action. Few managers take direct action to cause maintenance for part of their entire operating plan.

The fact that maintenance personnel cannot perform their jobs without full support and cooperation has to be apparent for some time. However positive action for recognition, and to correct matter by continuing to distinguish profitable maintenance of the future for the rest.



Figure 2

Thus, the most fundamental aspect of the successful use of maintenance resources. Maintenance alone cannot guarantee confidence in the equipment.

Experience has established that maintenance makes (has) a big impact on profit when all maintenance departments provide coordinated support and hold maintenance managers fully accountable.

A great mistake of operators in the 20th century was that they assumed that maintenance was a lone force, also capable of guaranteeing the reliability or profitability of equipment.

A great lesson for the 21st century is that operators must ensure levels of control and acknowledge and correct errors. Effective maintenance requires the participation of each department in the support of managers for, cooperation with, and use of maintenance resources.

Pensar strategies

One strategy for success is to build skillful planning first, followed by effective execution. Military strategy strategists never go into battle starting with their reserves from camp. Even treating maintenance as a single force, the handling of maintenance in the 20th century was similar to a military battle in a battle without reservations.

Therefore, for there to be a winning combination, maintenance managers must pull out all the stops. They must ensure that each department contributes to having reliable equipment in each phase of the equipment life cycle.

Equipment life cycle

A strategy of team managers first admits that teams are obsolete through a life cycle with support from different departments that need to be associated with each stage.

Each stage in the equipment life cycle dictates a progressive responsibility for each department that must each have a manager.

Selection.- Determination of the equipment that has the best use of sets and behaviour requirement (performance) against price, easy to operate and maintain, quality reputation and spare parts support.

Purchase.- Carry out bids to obtain the best equipment.

Installation.- Locate the equipment in service.

Tests.- Make sure that the equipment receives the necessary requirements for its use.

Operation.- Operate the equipment during the operation processes.

Maintenance.- Conduct repair and maintenance expenses.

Major maintenance (OVERHAUL).- Restore the equipment with the original design specifications.

Modifications.- Changes in the configuration of the equipment to produce better behavior or to correct or update the operating characteristics.

Replacement.- Replace with similar or better equipment with the same behavior characteristics.

Department Responsibilities

During the operation stage of the due cycle of the equipment it was put into service by operators and maintained by maintenance. But it is less obvious that the department's staff were training new operators and providing high or high training experience to their maintenance staff.

Similarly process data is being stored in production statistics and operating costs, accountants and managers are analyzing the information, fiscal actions and operating decisions. Normally, the warehouse and buyers are supplying parts and the workshops are repairing the components.

Execution of the proposed goals

The execution of the goals is established by the managers for each department when they find a community, then:

- Make sure the team behaves effectively
- Safety and correct operation of the equipment.
- Ensure proper maintenance.
- Provide quality material for maintenance.

These goals place each department at the bottom of the behavioral modes. This requires those who set too high a standard for their assigned goals. These goals encourage mutual effort.

- Comparing is not getting the right reservation unless maintenance provides other things.
- These operations are not proper equipment operations unless maintenance repair histories indicate zero problems with no operator error.

Evaluation behavior

At regular intervals, all the managers of the other departments meet to discuss the goals achieved, the appropriate information is used to observe the behavior of each department.

- These operations meet the maintenance schedule 85% of the time.
- The warehouse has zero backorders in its stock.
- These purchases of materials are 24 hours before being occupied.
- The maintenance plans are met with a minimum 65%.

Strategy as an agent of change

The strategy of team managers should be a framework to change the culture of the entire organization towards maintenance, many see this as a necessary evil. Thus, the strategy must also cause total workforces to view maintenance as a total operations plan, and the workforces and responsibilities to control and convey out maintenance must be reviewed.

This must be a "when he runs your stand your ground (steady)" mentality present in some organizations. The strategy should create a better appreciation of the importance of the maintenance strategy. So, the strategy can focus people on new ideas and responsibilities in the team. People have to be given fresh training in maintenance so they can apply modern techniques and information to realize and apply the benefits of a maintenance manager's strategies.

"Say goodbye to the excuse culture in maintenance"

Change the culture.- Before any maintenance strategy initiates the activities of this century towards the culture of maintenance, it must be corrected.

Managers who see maintenance as a cost expose failures in the improvement effort by suggestions that the maintenance culture (knowledge, beliefs, behavior) precludes their acceptance of potential changes to benefit. Successful implementation of a team managers strategy must recognize that improving maintenance behavior is not about starting and ending by alternating maintenance readiness solely toward change. The success of the implementation must impact the entire organization. The need to alter the culture must catch up and move up in operations. Everyone must adjust their thoughts to view maintenance as a path to productivity, improvement, profitable performance, and minimizing wasted time.

In the 21st century, I know it must include a total organization culture of improvement towards the activities that will be called maintenance. This is a prerequisite for successful application and modern breeding strategies.

Strategies to encourage the work team

Reforming maintenance responsibilities.- Once the organization accepts maintenance as an element of the production strategy, the strategy encourages the alignment of responsibilities.

Equipment operators view, check, adjust and correct through diagnostics, inspect, calibrate or change major components.

The organization perceives and verifies that engineering redesigns or modifies and buys by collaborating with maintenance, the warehouse and purchases. In plants, operators look at equipment to check, adjust, clean and make quick repairs.

Implement efforts in the work team

The implementation of reliability centered on maintenance requires a great effort in the work team, specialists for operations and maintenance. Operations identifies the functions and behavior standards, maintenance must identify the types of failures. Both collaborate in the consequences of fault identification.

Implementing Trust Centered Maintenance (CCM)

It is a logical procession of 8 steps that build or are part of the responsibilities of a department. Implementation steps include:

1. Selection of the most critical team most critical.
2. SDIIdentify the functions of the most critical equipment.
3. Establish control limits for these machines.
4. Decide the characterteristics de operation and types of faults.

A potential failure is an identifiable physical condition that indicates that the failure process has affected the machinery, typical failures could be:

- a) Vibrations signaling determined start on transmission failure.
- b) Indicating the onset of fatigue in machinery.
- c) Metal particles in the oil system indicating possible failures.

A functional failure is the facility to meet the performance specified by a standard.

5. Listing the consequences of failures
What happens if a specific failure occurs? The consequences of Failures can range from inconveniences to catastrophes. Without reliable equipment, quality production and customer satisfaction are difficult goals. It can also, put personnel at risk, create environmental hazards, and undermine energy efficiency, for all those reasons. The consequences of failure should be a primary object of maintenance.
6. Range of failure consequences.
Because the computer has increased in complexity, the number of ways it can fail has multiplied. From now on, failure consequences must be classified to guide maintenance personnel in taking preventive and corrective actions.
7. Use effective monitoring techniques.
Thes Operational failures result in lost production plus the cost of repair. Non-operational failures result only in repair costs. In machinery, the most important aspects are to avoid and reduce further consequences of operational and safety failures. From citing whether the most competent types of prevention and correction techniques, such as vibration correction techniques, are used. They can detect deteriorating conditions in equipment with greater accuracy and reliability than humans. These techniques detect hidden faults that humans cannot find unless they test a control mechanism and it does not respond. With the ability of more effective and cost-effective condition monitoring techniques, equipment conditions can be more accurately monitored. This allows a unit to remain in service if it continues to be known to perform as standard rather than replace the component at the first sign of potential failure. This approach to performance extends the life of components and units.

8. Establish a complete maintenance plan, based on the failure sequences, a maintenance program is applied, resulting in the conditions of the monitoring techniques. This identification of potential failures (starting failure) accurately and quickly excludes their functional deterioration to functional failure levels.

The most effective maintenance program is built on the implementation of steps.

Understanding the progress of equipment failures

Failure process.-

The components of a mechanical equipment are subject to wear, corrosion and fatigue. As deterioration increases; the profitability of the equipment decreases unless they are detected and corrected, Impairment; of components increases until the equipment fails. Failures are unsatisfactory conditions that must be considered in the context of using the equipment. A standard operating decision that is unsatisfactory for equipment use would build a fault. But the difference between unsatisfactory and satisfactory depends on the type of equipment and the environmental operations.

Traditionally, maintenance has observed, detected and corrected failures. This has been done by inspection and servicing at fixed intervals. So anticipating the age of any component that is likely to fail, maintenance has replaced them and performs checks at set times. This routine has often not had a presence on the current conditions of the equipment. This is done until the end of a certain period.

However, many faults are not likely to occur due to aging in equipment, from now on maintenance programs should not be obsolete, they are based on periodic replacement services, or component checks. Testing can actually reintroduce some of the factors that cause "Infant Mortality" failure of the equipment.
September 2016 Vol.3 No.8 19-27

These Current maintenance conditions are based on careful monitoring of current equipment conditions.

This is always less costly and more effective than replacement and examination at fixed intervals throughout the life cycle of the equipment.

The Time Based Checkup maintenance philosophy pays less attention to how components fail and the consequences of failure. There is an assumption that components wear out and become less reliable, as increasing aging by operation hitherto maintenance on machinery has prohibited restoring equipment to "like new" condition by periodic replacement of components or examined from the unit. Thus in actions maintenance has overlooked the failure processes themselves and the issues that constitute a failure.

This omission has given a process of maintaining these lost time and lower production rather than one based on a wide range of consequences for equipment failure. This helps explain why there is so much emphasis on knowing the goal of production and thus little attention to maintenance. Thus far, maintenance-focused reliability reminds us that those consequences affect all things reliability and utilization, and they demand more attention than they receive.

Reliability Age: Reliability is the probability that the equipment will survive a defined period of operations under specified operating conditions and without failure. From now on the unit of a component makes little sense unless a survival chance is associated with it. Component life (mean time between failures) or failure ratios are helpful in budgeting for maintenance tasks, set at appropriate intervals.

The success of a maintenance program can only be judged in terms of how well it will prevent the safety or operational consequences of equipment failure.

With these failure models, machinery operations require that maintenance must respond to real needs because many failure models do not exhibit pronounced wear periods, responsible maintenance must be aimed primarily at detecting potential failures or hidden failures, mainly failures. functional.

From now on those responsible for maintenance must also include, remove and replace major components at a specific age limit but only that the exact condition is confirmed with inspection, testing and monitoring conditions, simply never at the end of a predetermined period.

This really explains why more shortened operations that have instituted maintenance engineering strive to more effectively apply and manage the various maintenance responsibilities, that modern equipment requires the traditional physical inspection to be quiet combined with modern production techniques akin to an examination of ultrasound. Any of the responsibilities can only be set to perfect a reliable team.

Monitoring conditions techniques and applications.- The monitoring conditions are constituted on the failures that give some type of warning to which they can occur (potential failures). This is the physical indication that a functional failure (the computer cannot meet its standard operating specifications) is in the process of occurring.

This condition monitoring techniques can be obtained by pinpointing evidence that a fault is occurring. Condition based monitoring techniques used to determine potential failures are called condition tasks.

Obtaining and reporting of failures.- Maintenance and operation personnel have important roles in the detection and reporting of failures, equipment operators observe the dynamic operation of the equipment in its normal environment. They witness functional failures occur when equipment fails during use. In addition, they experience the results of a hidden failure when the controls fail to respond. Equipment operators are the most likely to report most failures because they are on or near the equipment during the changeover. From now on the initiatives of the operators in the report of the problem or in the limited maintenance operation can mean the complete improvement and the operation of the equipment. This reinforces the mutually supportive theme of team maintenance strategies.

Operators' ability to unavoidably determine faults is an additional aid to device and instrument warnings.

This includes computers that monitor hundreds of various equipment systems, which perform their functions. Personal of operation and maintenance are a complementary idea in fault detection.

Operators identify functional failures and hidden failures when controls don't respond. Maintenance personnel detect potential failures and hidden failures using condition monitoring techniques.

Conclusions

The application of these maintenance strategies mentioned above in this work are being carried out in the San Miguelito sugar mill in the state of Veracruz, all previous development has established that maintenance must be an integral part of production strategies. The 21st century must be built on this. Equipment in the 21st century will be more reliable and more complete. New strategies and procedures will be required to realize potential reliability and turn it into something profitable and profitable operations will be those that have using an equipment management strategy to evoke new procedures to apply modern management techniques as well as maintenance.

References

- Avalone, Eugene. (1959). Marks "Mechanical Engineer's Handbook". McGraw Hill, 8th Edition
- Me.smenet.org. (2016). Mining Engineering Online. [Online] Available at:<http://me.smenet.org>
- Lloyd E. Brownell, Edwin H. Young. (1959). Process Equipment Design: Vessel Design Edit. Addison-Wesley, 2nd edition