TOTAL PRODUCTIVE MAINTENANCE, A CENTRAL PREOCCUPATION OF THE MANAGERS

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Abstract:
This present study demonstrates that the role of the mangers in the productive maintenance is currently becoming more important. This assessment is formulated starting from the daily realities regarding the growth of the proportions of productions and along with these the growth of the volume of equipments which need a better care and maintenance for a proper operation. The productive maintenance has developed and emerged out of this necessity. Therefore, the productive maintenance in the economic theory represents the maintenance of the equipments and fabric at the highest productive level by cooperating with all departments related to production. This aspect points out that the maintenance and repair works of the equipments have to be the main preoccupation of the personnel and especially of the managers.

Keywords: total productive maintenance, total quality management.

1. Introduction

The performances of the enterprises are conditioned by the way of maintaining the equipment which leads us to the modern concept of maintenance which is currently experiencing a wide use. The productive maintenance in the economic theory represents the maintenance of the equipments and fabric at the highest productive level by cooperating with all departments related to production. The first step which ahs to be approached is to overcome the traditional barriers between the production personnel and the personnel which deals with the repair and maintenance work of the machines in order for them to work together. This idea relies on the practical experience where one can notice that the individuals who work together, without taking into consideration the organisational structure, using their abilities and ingenuity have as a common goal the top performance or the total productivity. This also puts maintenance under increasing pressure to improve, e.g., availability and reliability of production facilities, and to reduce cost and waste. With the introduction of Reliability-Centred Maintenance, Total Productive Maintenance, Business-Centred Maintenance and other concepts, maintenance already evolved a lot during the last decades (Waeyenbergh and Pintelon, 2009).

2. Total productive maintenance system

This way of approaching maintenance relies on the use of the two main techniques as for example: the preventive and the predictive maintenance, which are essential for the successful environment of the total productive maintenance. The predictive

maintenance is the process of using the information in order to determine whether a part or equipment will break down, and the preventive maintenance is the process of carrying out some activities as for example oiling some parts or cleaning the equipment in order to maintain its proper operation.

The function of total maintenance should be directed towards the elimination of equipment and enterprise maintenance. The objective is to produce systems which do not need the maintenance during the normal parameters of functioning. The unexpected break-down should not exist. Before the development of computer-assisted production, the operators from some enterprises were responsible for their machines and had a certain pride due to this responsibility. The operators with the help of the maintenance technicians spend a large part of their time maintaining the equipments. The recent technical implementations gave us more instruments in order to use them for the maintenance function.

In any performance analysis the first activity is to determine the current operation parameters which involve formulating some clear and thorough answers to some questions as: What is our situation today? What types of systems do we have no and how do they function? What is the current state of the enterprise and of the equipment? Do we have to start from the beginning or do we have systems which function and only have to be improved? These questions may lead to the conclusion that the total productive maintenance is an extension of the philosophy of the quality management and a function of enterprise. These aspects also lead us to the idea that in order to create a total productive maintenance system (TPM) one has to follow these basic steps:

1. The management has to learn the philosophy
2. The philosophy has to be promoted by the management
3. The training is based and developed for all the employees from the organisation
4. One has to identify the areas which have to be improved
5. One has to formulate the performance targets
6. One has to develop an implementation plan
7. One has to set self-governing work groups

There is no good or bad implementation method, but following these steps may also lead to a basic program for the beginning.

2.1. Learning the new philosophy

The most difficult thing for a general manager is the change. He has to learn about TPM and how this system will affect the future operations. There are many successful examples, but there are also organisations which have tried different techniques in order to improve the performance and which have failed. Taking a successful organisation as an example will offer a valuable information (Olaru 2004).

Any cultural change which takes pace is an option of long-term improvement. The easiest approach is that one has to accept the current performances and say: “Why should we change?” Unfortunately your competitors are the ones who will accept the change and they will be much ahead you in the future. In management there is also the concept that “I am the boss; I and you know the best how things are going around here”.

TPM tries to approach a still unused resource, the power of though and the ability to solve the problems of all the employees of the organisation. So, it is necessary to let people take some decisions. This approach is not a permissive management because the management is still responsible for the performance of the organisation, but it represents another method of managing an enterprise.

Many organisations used the approach “freshness of the month” in order to change the management techniques and this has led to credibility problems among employees. The management has been changed and the new person does not build on the old accomplishments; he comes with a “new system” which will solve all their problems. The lack of feeling of ownership seems to have caused to lower the spirits and to increase the dissatisfaction related to the management. The sense of ownership has to rely on what is good for the customers and for the employees, the ones who serve the customers. A short outlook on the approaches of Southwest Airlines or Hewlett-Packard helps us understand what it has to be done. These organisations and many other encourage the welfare of the employees from many points of view. It is also difficult to contradict their performances.

Initially this change will require more work from the management. Finally this will mean less work as long as the individuals will start solving their problems.

2.2. Promoting the new philosophy

The general managers have to pay an important amount of time to promote the system. The have to sell the idea, to let the employees realize that they are totally in favor of this idea. As in the case of Total Quality Management (TQM) or any other major change the organization has to be fully involved starting with the management. If there is no belief in the new philosophy and no involvement in its implementation, there will not be any positive results. “A new idea” is always expected. It is often believed that the new system will solve the problems and will lead to an immediate capitalization which will bring profits. A long term acceptance of a new philosophy is required. It was proved by the employees that this is a good way of making business (Popescu 2008).

The management will have to lead on the new path putting the new philosophy into practice. The organisations face difficulties due to an insincere management. Be of the best methods of implementing the new philosophy is to put it in practice. In other words one should begin by giving the employees more authority in what the maintenance and production is concerned. After the employees realise that the manger is serious and leads the organisation in a new and better direction they will cooperate. If the managers make a big fuss when introducing TPM, the employees will become sceptical; some of them will think that they will have to work more. The management has to earn their trust and the best method of reaching this goal is to change the management and then the employees.

2.3. Training

Teaching the managers the philosophy at all levels, starting with the highest-ranked manager and then with the low-ranked ones up to the last worker.

The board of directors have to learn and understand the ramifications of applying this philosophy to their organisation. Is the top management prepared and dedicated to reach positive results on a long term? Some people from management should be changed or they should choose to retire sooner because they will not change their way of working with people. These managers which adapt easily to the new philosophy should also be identified (Olaru , 2000).

The middle management has to learn how to act as to approaching the team and how the small work groups function. This organisational level seems to have one of the most difficulties dealing with this change. In the part year, the personnel cut has been performed on this type of personnel. This area was the most agitated one along its history. The philosophies which are promoted in

TPM and TQM lead to more consistent managerial structures. When you allow people to take their own decisions you do not need a many lawyers as the manager does to guarantee that they do their duty as they should.

The first line supervisors have to learn their role in the new environment. The supervisors who were used to coordinating their groups will find transition to be easier. Those managers who told their employees what they have to do up to the smallest detail will find this transition hard to accomplish. The supervisors will share a part of their power. The time of the autocrat manager is gone. A better educated and prepared workforce cannot tolerate that management style. In reality, a supervisor is as good as a "coach "for his team.

The employees have to learn about the different methods which can be used a part of the self-governing work group. Their need is to be guided, to be told what a maintenance worker does and what a production worker does. A TPM earning is the intersection of ideas among the maintenance technicians and the production operators.

2.4. Need of improvement

Some machines may break down or need a sustained maintenance. The employees who work with the equipment every day are more qualified to identify these circumstances. A first obvious step is to let the maintenance operators and technicians to report which machines or systems require most of the attention. It is essential to have a mixed team of operators and technicians which can coordinate this process. This section will offer credibility and will mobilize the organisation to TPM (Popescu 2007).

One of the first steps for the team is to identify the current stage. The next indicators have been developed by the Japanese and have been accepted by most of the practitioners.

There are six areas of loss which have to be followed and measured:

Losses with idle times:

1. Planned

a) Starting the equipments

b) Changing the shifts

c) Lunch breaks

d) Closing due to planned maintenance

2. Unplanned

a) Equipment break-down

b) Transition periods

c) Lack of raw materials

Losses due to slowing down:

3. Small or medium duration stops

4. Slowing down

Losses due to low quality

5. Inadequate processes

6. Rebates

These losses may be quantified with three indices and may be gathered in a single effectiveness index of the equipment. The equations for these indices are:

The idle time losses are measured by the availability of the equipment:

$$A = \left(\frac{T}{P} \right) \cdot 100$$

A – Availability

T – Operational times (P – D)

P – Planned operational time

D – Idle times

The losses caused by slowing down the work speed are measured by following the effectiveness of the performances using the equation:

$$E = \left(\frac{C \cdot N}{T} \right) \cdot 100$$

E – Effectiveness of performance

C – Cyclic theoretical time

N – Process-related quantity

The loss due to the poor quality is measured by following the degree of quality of te products using the equation:

$$R = \left(\frac{N - Q}{N} \right) \cdot 100$$

R – Quality of the products rate

N – Process-related quality

Q – Nonconformities

The effectiveness of the equipment is measured as the sum of the decimal equivalent of the three above-mentioned indices:

$$EE = A \cdot E \cdot R$$

EE – effectiveness of the equipment.

The objective of the improvement is that the effectiveness of the equipment should be of at least 85%.

Example

The production figures of last week from the machines centre JL 58 were the following:

Planned operations = 10 hours / day 5 day a week

Losses caused by interruptions due to meetings, delays in receipt of materials, preparation, etc. = 410 minutes/week

Planned interruptions with maintenance and break-down of the equipment: = 227 minutes/week

Theoretical time cycle (standard) = 0,5 minute/unit

Weekly production = 4450 units

Used parts = 15 units

P = 10h/day ∗ 5 days/week ∗ 60 min/h = 3000 min/week

D = 410 min/week + 227 min/week = 637 min/week

$$T = (P - D) = 3000 - 637 = 2363 \text{min}$$

$$A = \left(\frac{T}{P} \right) \cdot 100 = \left(\frac{2363}{3000} \right) \cdot 100 = 78{,}8\%$$

$$E = \left(\frac{C - N}{T} \right) \cdot 100 = \left(\frac{0{,}5 \cdot 4450}{2363} \right) \cdot 100 = 94{,}2\%$$

$$R = \left(\frac{N - Q}{N} \right) \cdot 100 = \left(\frac{4450 - 15}{4450} \right) \cdot 100 = 99{,}7\%$$

$$EE = A \cdot E \cdot R = 0{,}788 \cdot 0{,}942 \cdot 0{,}997 = 0{,}740 \text{ or } 74\%$$

It is obvious that the availability of the equipment should be improved in order to reach the effectiveness target of the equipment 85% (Scrioşteanu, 2009).

2.5 Objective

The objective would be set after the need of improvement has been identified. A first step is to set the program for the mot important problem. The technicians and the operators want to solve this problem faster that the management because the management causes them daily more problems. Identifying the needs and setting the objectives lead to the organisation of the teamwork (Popescu 2007).

2.6 The development of the plans

One has to carry out the development and the implementation of a general action plan for the training of all employees. The plans for the development of the self-governing work groups should be kept during the training of the workers.

The plan is to use maintenance technicians and operators teams to solve the problems which come up. The priorities can be set and the management can take a decision regarding the resources in order to correct some basic problems. Using the team approach will set the base for the development of the self-governing work groups, which are teams appointed for the daily operations. The employees should decide how these self-governing teams are structured (Popescu 2008).

Another part of the planning process should take into consideration the self-governing groups which will change in time. As long as the processes and the procedures are improved, the structure of the whole organisation will change. It would be unreasonable if the self-governing work groups did not change.

2.7 Self-governing work groups

The self-governing work groups are set according to the natural flow of the activities. The operator has to be responsible of the equipment maintenance up to the point when he is responsible to do this. The maintenance personnel working in certain areas or having certain abilities have to be identified. The maintenance operators and personnel are put together, starting as a self-governing group. These groups should have the necessary authority to take decisions regarding the maintenance of the equipment on a higher level (Popescu 2007).

The structure of the self-governing groups will vary according to the field and the branch of the industry. The involvement of the employees gives us the necessary information in order to determine the structure.

The maintenance technicians are also consultants for the operational personnel. They train the operators to carry out some works like oiling the machines, minimum adjustments and setting the equipment.

The general purpose of the self-governing groups is to reduce the repair works. A good part of this thing is to free the high class maintenance technicians from the daily routine. These technicians have to be used more efficiently in order to test or assist some faults which the self-governing groups cannot solve.

3. Conclusions

The seven steps plan from this study presents the program of setting the TPM. These can be adjusted if there are organisational problems. A total productive maintenance (TPM) activity will lead to an improved quality and a high productivity.

The conceptual approaches also took into account the use of the two main techniques, as: the preventive maintenance and the predictive maintenance which are essential for the successful environment of the total productive maintenance.

This analysis leads to the conclusion that the function of total maintenance should be headed towards the elimination of the equipment maintenance and fabric maintenance, the objective in these cases being the production of systems which do not need maintenance during their normal functioning periods. These systems are possible today after the development of the computer-assisted production. Last but not least, we consider that in order to create a total productive maintenance system, the following basic steps have to be followed: the management ahs to learn the philosophy , promoting the philosophy by the management, the training is based and developed for all

employees from the organisation, the areas which have to be improved have to be first identified, the performance targets are formulated, an implementation plan has to be developed, the self-governing launch groups have to be set. These basic steps of a total productive maintenance system are analysed and we will refer to the current Romanian economic realities. It was also pointed out that there is no good or bad implementation method, but following these steps may also lead to a basic program for the beginning.

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