

# BENEFITS OF EFFECTIVE MAINTENANCE ON MANUFACTURING TECHNOLOGY AND ENGINEERING FOR NATIONAL DEVELOPMENT

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## **Abstract**

The prevailing global economic recession is a pointer to the fact that, every nation must sit up and look inwards by blocking every loophole in her economy. Maintenance management has a key role to play in creating awareness that, the cost maintenance a facility at its near peak performance level is money well spent and far below the resources needed for promotion. This paper, therefore, elucidates the role of maintenance in the national asset management, explores the need for maintenance policy, while maintenance scheduling, maintenance of rehabilitation works as well as the invariable, pragmatic and scientific recommendations are put forward for considerations and implementation to pave way for national maintenance policy formulation.

## **Introduction**

Olusanya (1998), said that, "the implementation of a programme for the management of an institutional or company's assets has never been so important now that, we are more involved with the European Market, and, indeed, has been an integral platform 1992." Chief engineers, group engineers, work engineers, building services managers; premise managers - the list is never ending with respect to job title and designation. While the individual's title may change, the responsibilities rarely alter, in that, it is from the person in those positions upon whom the employer depends on much. Building premises, factories, production equipment, facilities services and utilities and local services must be maintained in the moist sound, safe and economical way to ensure that, the client or user is provided with the appropriate goods, materials and working environment, as all these fall within the limit of the engineering maintenance department.

In a constantly changing work environment, with the introduction of new techniques, work practices and legislation, the engineering department must ensure that, they maintain an adequate level of continuous educational training. Major changes include the wide implementation in construction, installation and service fields of specified quality assurance, the inaction of more specific legislation, codes of practice, guidance notes for health and safety, and the standards being introduced by COREN.

## **Maintenance System**

The benefits to be accrued from the implementation of a programme of planned maintenance can be found in the efficient and economical operation of the plant and equipment and the utilization of resources (i.e. plant, equipment and manpower) while also maintaining a sound standard of safe working and environmental conditions for operations, other occupants and employees within the workplace. Maintenance systems vary, depending on the location of the plant and equipment and/or company policy. System can range from the complete maintenance of plant and equipment using all available methods to their replacement on failure. To meet the company's requirements it is then necessary to decide on the maintenance system that provides the most satisfactory benefits overall.

The most commonly maintenance systems in use are: planned, preventive, schedule corrective ad emergence:

- (i) *Planned Maintenance*: Is work having benefited from information issued by manufacturers and suppliers, the experience and knowledge of the service department staff and report and records from previous services visits,
- (ii) *Preventive Maintenance*: Is work to be considered out as a specific frequency as indicated by potential facilities or know reduction in efficiency of the plant and equipment, thereby avoiding failure or a decrease in performance.

- (iii) *Schedule Maintenance*: Is work based on known information, such as number of operations, hours run, mileage, etc. and can therefore, be carried out at a predetermined time interval,
- (iv) *Corrective Maintenance*: Is work carried out following the failure of the plant and equipment, and is so designed to return the component to its normal operating condition,
- (v) *Emergency Maintenance*: Is that work which is required to be auctioned without delay due to a failure of component which, if not implemented, would lead to failures or even permanent damage, resulting in the total loss such a condition may also be dangerous to personnel.

### **A Planned Maintenance Programme**

A planned maintenance encompasses all types of maintenance covered within the preventive or scheduled system; this can be examined in more detail. In preparing a planned maintenance system all the available sources of information should be used. These include 'manufacturers and suppliers' literature, trade associations, professional institutions, knowledge and experience from within the engineering department, history and feedback from previous work for the specific condition monitoring life-cycle costing and predictive maintenance procedures should all be considered during the preparation of the planned maintenance system.

Planned maintenance system should not be complicated. The simpler the system is to meet the requirement of the organization, the more likelihood of it being used with satisfactory results. This aspect is of greatest importance when, due to the size of the organization, engineers may be transferred from one department to another to gain a greater knowledge of the total company or organization. This may of cause be implemented in the order of:

- 1) Asset register;
- 2) Maintenance and repair records;
- 3) Technician and craftsmen guidance notes;
- 4) Planned schedule;
- 5) Week tasks;
- 6) Work docket; and
- 7) Year visual aid plan.

Planned maintenance programme are an essential weapon in a department's memory to ensure that, the services it is called upon to meet up its responsibilities are fully met. The traditional method of working from pieces of paper or individuals 'own' notebooks as to when maintenance is to be carried out or when the insurance representative is due to visit to carry out an inspection are no longer satisfactory. This is especially the case when the skilled resources necessary to carry out the work are more difficult to obtain. It is therefore, essential that a planned maintenance programme be established, which can encourage all (or element of) the different maintenance methods of establishing the frequency and/or work to be carried out.

This may cause the implemented planned maintenance system to fail or not be used in its full effect, due to the incoming engineer not understanding it fully.

In preparing a planned maintenance system, the opportunity should be taken to involve the whole organization more especially the departments concerned. This can be achieved by using the operations who will subsequently move into action to carry out the initial survey of plant and equipment.

To assist engineers to implement planned maintenance system that can be of benefit to the department and the organization at large. It is important that a programme by set up with respect to the system's implementation, guidance and items should be considered are:

1. department to be covered;
2. plant and equipment to be included;
3. technician and craftsmen trades that are available;
4. person responsible for preparation and implementation of the system; and
5. administrative support.

It should be noted that initial interest in preparation and implementation of planned maintenance system could gradually decrease if only one person (preferably an experienced engineer) is given the responsibility to ensure that, the proposal is carried out to its satisfactory conclusion.

It is essential that, the nominated person is given adequate support where necessary, to ensure that, planned maintenance system, irrespective of the location or type of business, is complied with from a number of standard elements. Such as:

- 1) asset register;
- 2) maintenance and repair record;
- 3) technician and craftsmen guidance notes;
- 4) planned schedule;
- 5) week tasks;
- 6) work docket; and
- 7) year visual aids.

*Planning Schedule:* It is at this stage in the preparation of the planned maintenance that the engineer's knowledge and experience of maintenance is essential. In preparing the planned maintenance schedule, it may be found that, information and supplier is no longer available. Technicians' and craftsmen's knowledge can play a major role in this planning stage.

Experience indicates that, when preparing the schedule this should be carried out for each trade group. Prior to entering any asset detail on the planned schedule, item such as holiday periods and seasonal shutdown programmes should be indicated. This can be done by the use of highlighter pens on the calendar weeks that require specific attention to loading of the relevant work tasks.

In scheduling the assets and work tasks to be carried out it is recommended that, the plant room and department that require the greater resources (i.e. man-hour) should be entered on the planning schedule first. The schedule for each item of plant and equipment follow the same and their asset numbers are entered for each specified location.

Planning the frequency, work tasks and man-hours for each asset than follows. Choose the week in which the frequency service is to be undertaken e.g. yearly; "enter a 'y' 'Monthly').

To complete the planning schedule for the specific asset, the hours required to carry out the work at the nominated frequencies are then entered (e.g. "y"/12; 'QV4; 'M'/1, etc) this could be done in pencil so that amendments can be easily made.

Plant and equipment that require a service on completion of a certain specific period of "hours" may through this method avoid the need to record remaining hours or in the cost to transport, mileage on daily or weekly basis to schedule the relevant planned maintenance. If it is essential that the maintenance of a certain number of operating hours or mileage, then, this must be allowed for in the allocated work hours of the relevant trade groups.

Peaks and troughs on the man-hour allocated weekly for planned maintenance can be avoided if hours entered are added up for each week after a number of assets have been scheduled. All assets to be covered by the planned maintenance system are scheduled in the same plan, thereby providing the engineer responsible for allocating the workloads with total man-hours for each trade group.

There are two methods of entering man-hours:

- 1) The actual hours necessary to carry out the planned maintenance work tasks.
- 2) The 'total' hours to complete the planned maintenance work tasks (including non-productive hours). Non-productive hours would include such items as collecting spaces, tea breaks, discussions, etc.

The planned maintenance system most commonly used is that indicated where as the method of calculating the hours is preferred is there is a productivity scheme in operation. British Council (1998) emphasizes on the need for Training of Engineers and Technicians, as a major concern within maintenance departments and services contractors experienced maintenance technicians and craftsmen. This has been allowed to occur through cutbacks in staffing levels accompanied by 'a reduction in training, Maintenance training is provided by a few companies, and it could be said that these are progressive in that they acknowledge that, by providing training for their situation of searching for the limited skilled labour now available.

Planned maintenance can reduce the demand for highly experienced craftsmen in that, if the

instructions issued in work docket and advice guidance notes are adequate, a less skilled person should be able to perform the work task correctly. It follows that adequate training must be provided to ensure that and experience. The work task given will be carried out by required standard.

There are a number of suitable training established works available, but for the specific plant and equipment within the organization, in house training provides a better result. Carrying out in-house training would cost and ensure that, the subject matter is relevant. Support in this training can be complemented by the use of manufacturers, suppliers or specialists (e.g. control and/or service engineers). It will be found that such companies encourage this method, as it helps to reduce the demand on their own highly skilled staff. Trained operatives can carry out basic fault finding either alone or by telephone. With changing face of technology, it is imperative that service departments keep up-to-date with the least practices. Training should not be restricted to any specific individual but should include engineers, technicians, craftsmen and, where appropriate, semi-skilled staff

Abdullahi (1990), states that, there is no nation that can develop technologically without well-trained Engineers, Technicians and Technologists with maintenance culture. It is imperative for us to invent our own technology and work toward its development since there is no nation that is willing to transfer its technology. He added that, routing maintenance of equipment has not been accorded the right priority in our national objective which has resulted into avoidance breakdown of equipments in our industries and institutions, thus, has invariably increase the running costs of our industries and institutions which could have been avoided if the maintenance culture was embedded. Government could no longer afford such wastages, as public funds are not inexhaustible.

Sani (1993) stated that, the transformation of a country from a state of underdevelopment into an industrialization nation is complex. The country has to be self-sufficient in her needs. After being self-sufficient, she has to expect the surplus for the much-needed foreign exchange to purchase products and equipment she cannot manufacture locally. To achieve these objectives, the role of maintenance in today's technology cannot be over emphasized, because without it, most private and government owned companies, most especially, in the manufacturing sector would be paralyzed.

Before the 1980's efforts at development did not emphasized the need for the maintenance and care for the already existing equipment, machines and infrastructures, but was limited to purchasing of already manufactured equipment, and implements from the developed countries (Europe and America), without any attempt to encourage and infuse the concept of the old-made-new tradition or fashion. Acquisition of indigenous technology is the only way that can encourage entrepreneurs particularly in the area of manufacturing equipments and spare parts for the development of locally fabricated equipment.

Maintenance is often used as a synonym for repair. This is not correct. Everybody who is a car owner knows that a service of preventive actions has to be performed to keep the car in good running condition. The car is oiled and greased regularly. Essential parts are replaced before they breakdown. All these activities, which, are needed to keep equipment in good operational condition, are the essential elements of what we understand by maintenance. Eventually, some replacement of faulty parts may be needed. Unless an accident occurs, repair will be reduced to the barest minimum if all activities of preventive maintenance are punctuality performed.

## **Recommendations**

For technological development and re-maintenance engineering the government should place emphasis on the practical training and experience, after acquisition of the paper qualification. Furthermore., engineers, technologists and technicians in the stream of service either in the government or private sectors should be allowed to effectively acquire as much on-the-job training in their respective fields of specialization in order to both fabricate equipment with their spare part so as to further emphasis on the need for maintenance and repair of existing equipment and implements in our industries and institutions.

## **Conclusion**

Finally, at this stage of our national development, Nigerian engineers, scientists and technologists must explore the possibility of having all present equipments in functional state and advance into the phase of design and fabrication of our own machineries and equipment for industrial use. This will greatly reduce our over-independence on all resources products in this area of engineering as it is at the moment. Sani (1993),

had this to say, "Our survival depends on the quality of engineers, scientists, technologists and technicians.

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