MAINTENANCK MANAGEMENT - CONDITION MONITORING

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1. ABSTRACT

In a new Industriel Country such as Zimbabwe an important emphasis is placed on maintenance. The traditional routine of correcting a fault when it arose is now losing credibility and large organisations in Zimbabwe such as Transport, Electricity, and Mining are seeking ways to the ideal situation of 'Planned Effective Maintenance Management Programmes.

It is the aim of this paper to outline the general objectives of an effective maintenance management programme and highlight in the context of this, the role of Vibration Condition Monitoring (CM).

A case study of the situation in a Steel Works is presented in which unplanned, ad hoc techniques were previously adopted. An attempted solution to the problem was to install CM as a panacea, but in isolation from a well planned and documented system.

2. INTRODUCTION

In Zimbabwe there is an urgent need to establish planned maintenance on a National Level. Hitherto, it has been accepted that the maintenance problem lay only in the actual repair operation. Such a strategy proves to be costly in lost days due to breakdowns and to the need for undue large storage facilities to prepare for stoppages.

This limited approach was believed to be one of the main reasons for inadequate maintenance performance in Zimbabwe whose new awareness and positive approach to the solution of the problem is encouraging. Hence maintenance is now promoted to planning and managerial activities at both the enterprise and national level.
The most important distinction in maintenance terminology is that between planned and unplanned maintenance. Figure 1 (1) outlines the problem, showing the two branches-planned and unplanned.

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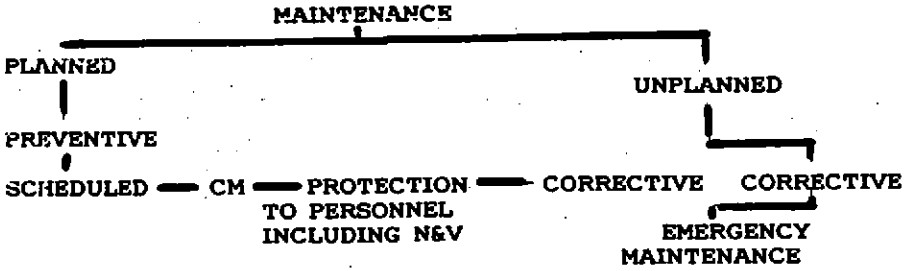

FIGURE 1

There is convincing evidence in favour of the planned maintenance route and this need not be elaborated in this paper. This includes extended useful life of the plant, greater plant availability, reduced production delays, improved equipment replacement policy, better investment in spare parts, effective utilisation of maintenacne staff, more effective co-ordination between production and maintenance staff, improved safety from plant and machinery, efficient cost and budgeting control.

3. CONDITION MONITORING

An important aspect of a planned maintenance system is the inclusion of CM. However, there is a mistaken notion in industrial enterprises that CM is a panecea.

CM although essential in many industries does not in isolation constitute a planned maintenance system. It is merely an adjunct to a system. A planned system could be operative and efficient without CM. The converse is not the case.

CM without proper planned documentation can be counter-productive. Technical details of CM especially Vibration CM is not relevant in this paper as the techniques are well established and widely used throughout the industrial world. A brief case study of CM in a steel work is illustrated below.

4. CASE STUDY

Maintenance at the ABC Steel Company

The ABC Steel Company has approximately 400 plant employees. It produces an average of 5000 sheets of rolled steel per day. The process is continuous, the material passing consecutively through rolling mills, quenching baths, electric furnaces, vibrators, finishing mills to storage. Characteristic of the situation are large

expensive machines. The plant operates a continuous schedule of work. Uninterrupted production is therefore essential.
The maintenance of the mechanical equipment is in the hands of several foremen who make tours of the plant for inspection of the equipment in an attempt to discover what is required to be repaired before breakdown occurs.

The only documentation is written down chronologically in personal notebooks. Certain specific potential failures are noted, especially bearings on the mill's transmission system. Measurements are made from time to time of the depth of the shaft in the bearing housings and if they reach a certain depth they are changed.

A recurring problem is the need to replace bearings, shafts, and pinions. This can create many storage problems and the random nature of the personal maintenance funtion carried out, encourages large ad hoc storage facilities.

The next stage is that the company seeks a solution. The scene is typical of many industries, and a CM company incorporated their system for monitoring the health of bearings, gears, shafts, through vibration. However, although this helped in terminal fault detection, house keeping, and quality assurance, as is the objective of CM it nevertheless fell short of a planned maintenance system.

A major crisis emerged when a gear box bearing for a main roll drive failed. This was predicted well in advance by the CM system. However, there was no adequate replacement stock documentation. Hence no part was available.

When a breakdkown occurs in the process industry, about 90% of the factory can cease production. Such was the case at the ABC company. As a result of this, the annual downtime was increased considerably with the inevitable consequence of late delivery, and lost profit.

This mistake by well intentioned CM companies is not uncommon. An effective system to be planned must commence with data concerning the production facilities.

A Production plan, utilisation of capacity, information on maintenance resources and any future production programme is necessary. Following this there must be a plan of operation of maintenance in order to put the data into operation.

This leads to a dynamic maintenance policy. In essence this is the continuous measurement and adjustment of all the appropriate parameters to satsify the objective of the planned system.

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The ABC company failed to follow any plan. Hence, apart from predicting when certain shafts etc would fail and preparing for this contingency there was little other advantage.
No data records were kept, plant failure history was not scheduled and stores merely replaced components and ordered replacements when the CM engineer gave prior warning.

The expense of installing the CM system therefore, was not justified and the plant continued to operate on an ad hoc basis as before.
The case study illustrates the consequence of crisis maintenance management in a single company. This may be extrapolated to a National Level.

A report (2) showed that on a National Level in UK #550m per annum could be saved if Planned Maintenance were adopted. This saving includes the cost of installing Planned Maintenance Systems throughout the country's National Industries.

The conclusion is that the maintenance problem does not lie only in the actual repair or even in the monitoring function, but in the planning and managerial activities at both the enterprise and the national levels.

A welcome introduction to a more complete or holistic approach to maintencance has been introduced by the new European Noise regulation and the new Dangerous Chemical regulations in 1990. Thus maintenace should also be thought of as protecting machinery, planning for breakdwons and also for the protection of all personnel.

5. SUMMARY

This paper outlines the need for a planned maintenance policy both at individual company level and national level. Pursuing one particular aspect of maintenance such as condition monitoring in isolation, and neglecting an overall planned maintenance strategy can in some cases lead to a serious increase in downtime.

6. REFERENCES

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