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EQUIPMENT MAINTENANCE STUDY

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Abstract: *This paper contains a few knowledges about the equipment maintenance. The study proposed refers to two aspects particularly important in the maintenance study. They relate to: global vision of the management and maintenance routine maintenance conditional, for which is presented a case study in the turbomotor enclosure. For a better understanding of total maintenance need to be analyzed the main methods and philosophers of maintenance implementation..*
Key words: *equipment, maintenance study, digital images, gray levels.*

1. INTRODUCTION

Verb "maintain" becomes synonymous with "a purpose to continue to you exist." and thereby the need to extend the service life is the essence of the maintenance work.

The need for maintenance appears natural to oppose over the defect forces and can be the result of a work as a maintenance plan or repair of the equipment.

Reduction of costs and cost industrial process can be achieved only by combining the various factors: increasing the reliability machine, enhancing safety in operation, the decrease operating costs, all leading to a total cost efficiency (Fig. 1). As a result, machinery maintenance may not be regarded in isolation. This can be shown schematically as shown below.

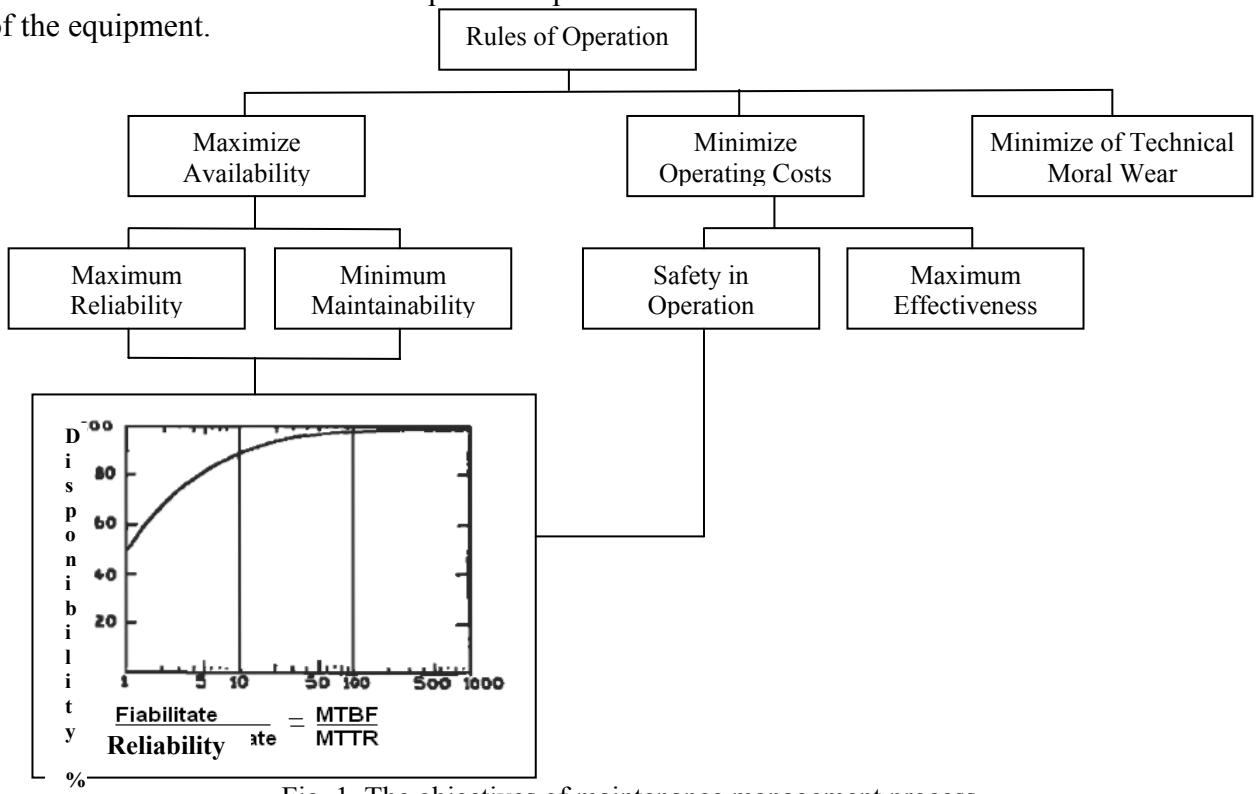

Fig. 1. The objectives of maintenance management process

2. GLOBAL VISION OF THE MANAGEMENT ROUTINE MAINTENANCE

Routine maintenance is known in the management and shall apply to the best 10 methods that support the process of maintenance. They are presented succinctly as follows:

1. Working in a team;
2. Productivity oriented contractors;
3. Total integration with replacement parts and services from suppliers;
4. Support on the part of management;
5. Proactive planning and programming;
6. Continuous improvement of the process of maintenance;
7. Continuous improvement of the process of purchasing the materials and services;
8. Integration of the maintenance process in the organization;
9. Improve management commands;
10. Reliability based on production.

For complete and correct understanding of the maintenance management grows a few aspects of it.

2.1. Maintenance Classification

First step is given by planned and unplanned maintenance application (programmed). The latter has only one division, which translates the reactive maintenance, planned maintenance, which contains proactive maintenance, which in turn contains as division maintenance programmed. Of those listed can be understood that for the application of a servicing programmed, path to be followed is particularly long and requires continuing training, which is based on a history of the repairs machine [1].

2.2. The Maintenance Strategy

There is not a philosophy, a strategy absolute maintenance - all types there are and will be used, more or less, all in the same way co working.

In most of the enterprises is still present all types of maintenance (corrective maintenance, routine, systematic, predictive, proactive and in the improvement) Priorities shall be determined in dependency on the strategy for maintenance, supported by management. The main strategy of the maintenance is shown in the table no. 1.

Table 1.
Maintenance Strategy and Those Characteristics

No	Strategy	Type of Maintenance	Characteristics
1	Repair after a fault	By Accident / Corrective	Repair after a deviation from specified conditions
2	Detection/ Remove of Disorders	Routine	Daily maintenance carried out by the operator
3	Time-based or operating calendar	Systematic preventive	Work on a certain period of time, according to a predeter-mined schedule
4	Under the conditions	Conditional on preventive/ predictive	Work on the basis of a signal /criterion
5	Exclude Causes of Damages	Preventive, Predictive	Ensure conditions exclude damage
6	Changing/ upgrading machine	The amendment, predictive	Changes in the machine leading to increasing performance

2.3. Maintenance on the Basis of Conditions

Maintenance based on conditions using many different methods of measuring and control additional parameters introduced in agreement with the machine.

The most frequently used are:

-Detection any vibration. Vibration measurement and analysis is a technique applied frequently machines with moving parts of the rotation

- Analysis lubricants. It is known that the lube oil is the only component in contact with all parts equipment. The check shall be performed on the oil little part collected at regular intervals in exactly the same area of the car in the oil circuit and analyzed. Check for who can control the oil's viscosity and density and contamination with foreign matter

in particular little part of metal or carbon footprint. Are more and more used detectors of magnetic span.
- Thermal images (in the infra-red). Detect hot spots and dangerous is the most dynamic manner of use of this technique.
- Acoustic emissions.

The role of monitoring conditions is to supervise and protect equipment. It provides a rapid improvement in the business financial recurring of users.

2.4. The Maintenance Inspection

Types of inspections of the maintenance may be classified as inspections at shutdown, in operation and by removal. Inspections to a stop (stand-by) are carried out when the installation is halted for the duration short and include routines inspection to the systems, installations Annexes and the calibration of the device. Inspection of the operation is carried out by the observation parameters while turbomotor works. Inspection at the time of the removal need to be removed when turbomotor internal components for the inspection and is effected on the various degrees. Inspections at the time of the removal operation is progressing from the inspection "party hot" waveform and inspection of hot gases up to major inspections of all marks.

Inspections of operation consist of continuous and general observations made while the unit is operational. It starts by the establishment of the base-line of operational data during initial start-up of a new establishment and after any major job for removal. This database then serves as a reference from which subsequent organ damage of the car can be measured.

Data should be taken to determine normal to start as the operating key parameters of stable equipment. Steady State is defined as that State in which there is no large changes in the parameters (for example: Conditions under which a change not more than 3 °C in the temperature is going on at an interval of 15 minutes).

Data must be collected at regular intervals and should be recorded to enable an evaluation of the performance turbomotor maintenance and requirements as a function of operating time. These data of inspection at operation include: Loading vs. Exhaust gas temperature, vibration, pressure of the oil lube circuit, the temperature of the gas from the exhaust, the exhaust temperature, and the time to start. This list is only a minimum and other parameters should be used for a check rigorous and efficient. A graph of these parameters will help to provide a basis for interpretation operation of the system. Deviations from the rules help identify problems, changes in calibration, or of the components damaged.

3. ACOUSTIC EMISSION-CONTROL

This method of control is a technique which involves purely outward detected abnormal operating conditions by measuring high frequencies, in such a field between 50 kHz and 1 MHz, arising from the physical processes of the type: friction, disposal of the material etc. In the absence of such processes of malfunctioning, the signals of high frequency in the background are low; signals can be detected very well in relation to the noise.

Acoustic emition is very useful in particular those users that want answers fast and will not accept major investments in systems on-line and have in the farm implements critical of production. In the methods of monitoring controls portable acoustic emission equipment quickly determine conditions, on the spot, and a more detailed analysis and complicated becomes unnecessary.

3.1. Case Study

There is a study made for an acoustic emission-control inside a turbomotor space. The images are presented in the figures 2, and 3, and they are considered in the good reason to give the explanation about the equipment

health. The noise in the enclosure of turbomotor is greater as the normal sound inside the working space.

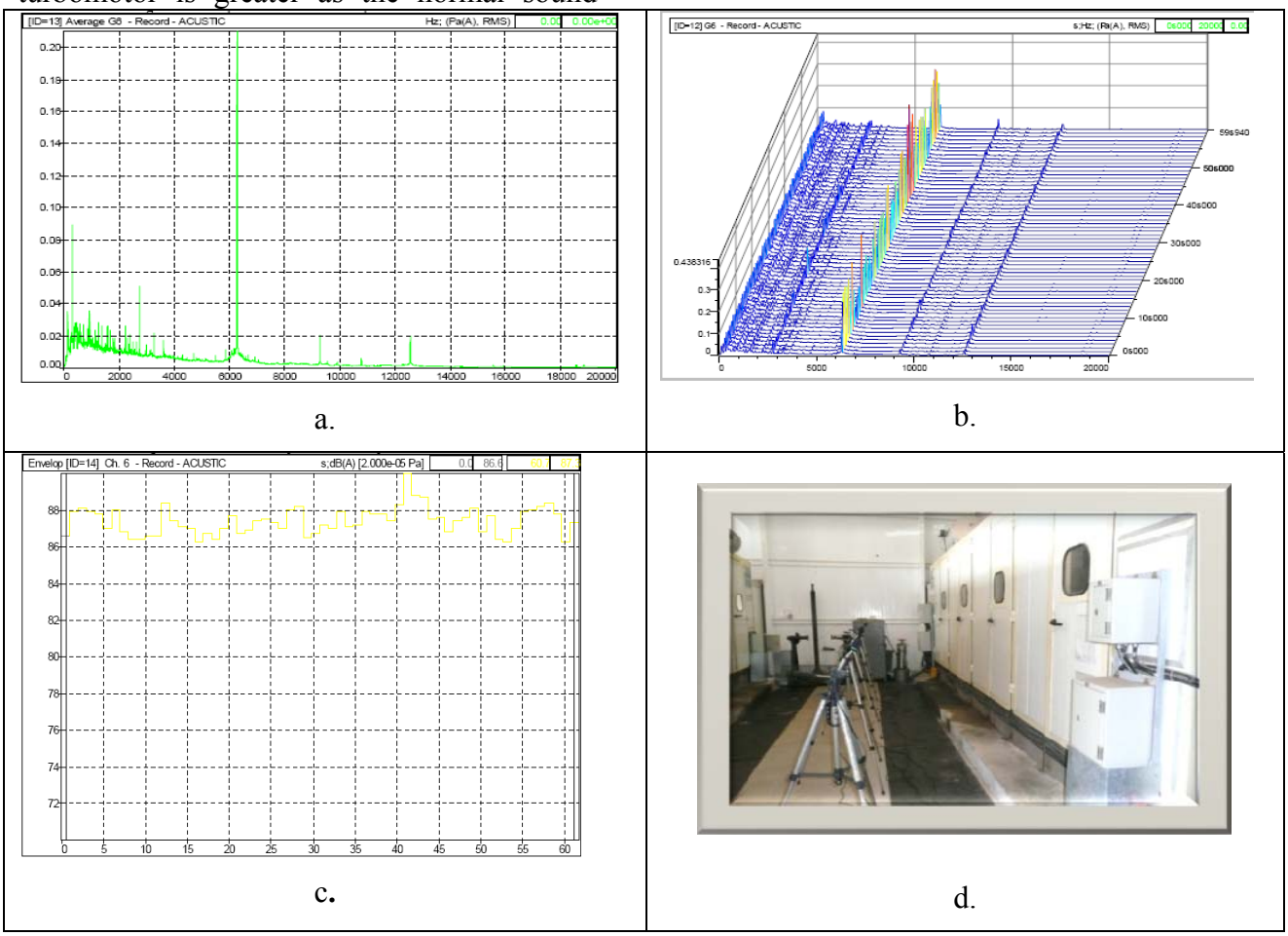

Fig. 2. Time variation of the acoustic pressure. a. FFT linear representation; b. FFT spatial representation; c. acoustic pressure; d. the enclosure of turbomotor.

The noise map shown in Figure 3, is specifically designed to sound mapping global assessment of exposure to noise to determine general forecasts.

This sound mapping has been carried out by the introduction of digital equivalent values in a program dedicated to spreading sound waves, on the basis of the signals measured in predetermined corresponding points in the work. It is noted that all the curves of the sound level, are drawn only on the basis of the 50 points, to provide a picture satisfactory.

By the noise produced by car or in the installation we can estimate the fault with 1 - 4 weeks before he was producing, but already it is too late and the costs for repair, are significant.

The maintenance engineer has to define the system and subsystems, and classify faults and the manner in which they appear, to identify the effect, the impact of these faults may have to ensure that the requisite on the basis of an analysis made it is to intervene on the installation to be in charge of procuring components to replace it and to make analysis of the costs of day-to-day maintenance all at once and the impact of notwithstanding subparagraphs new changes in the system on which we want to fortunes to improve plant.

3. CONCLUSIONS

The paper is the first part of PhD Student mechanical engineer Marinel CÎMPAN in which is a lot of studies regarding the maintenance management. This paper

contains its position about the maintenance management, and it can be expressed in the following conclusions of this paper:

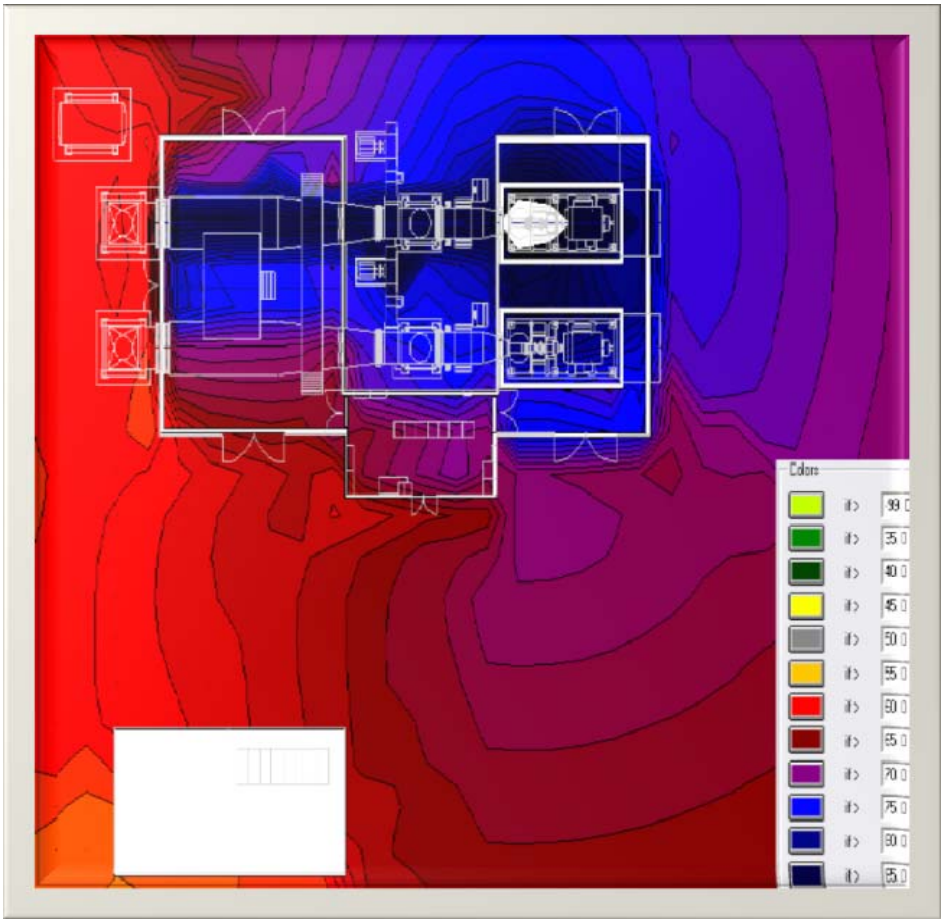

Fig. 3. The Noise Map in the Turbomotor Enclosure.

1. For the purpose of achieving a high level of reliability and to increase efficiency implements complex, the use of, and lately, in particular for a complex system of maintenance: to combine more than one strategy of preventive maintenance and corrective-predictive. First system - preventive maintenance only based on current practice of planning for inspection and servicing of installations, using the algorithm the rigid rules and procedures of maintenance.
2. The second system - corrective maintenance, predictive melodramatic flexibility to optimize and monitor the performance of installation, on the basis of the risk known, with increase of the safety and economies of exploitation machine. The main idea in this type of complex of the maintenance is that the consistent application of corrective maintenance algorithm-predictive the lifetime of the machine, between the two repairs to increase and times for the parking service to fall, leading to reduced operating costs. At the same time this type of maintenance leads to improved efficiency in the functioning machinery, thus helping to improve their reliability.
3. A program of integrated maintenance (preventive predictive), provides industry an alternative to the current maintenance practices. A synthetic representation of the new concept of maintenance management is shown in the diagram below and reflects current concern in the field. The triangle,

dubbed the "Golden Section", in the literature, specifies that the maintenance has become complex and interactive between the three components of its: predictive maintenance, service (inspections scheduled) and spare parts. It was presented in the case study of this paper for a turbomotor enclosure.

4. Through the use of team work and interweaving various disciplines, each member of the team discovers his knowledge and skills on which he was not aware of the fact that it has. A work crew becomes an effective force that is growing steadily, reaching targets and working in an atmosphere very efficient. Nature team change: from a collection of disciplines to a unitary entity. It is very important for the management maintenance implementation in the system of organization of the company.

4. REFERENCES

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Studiul mentenanței utilajelor

Rezumat: Lucrarea conține câteva noțiuni despre mentenanța utilajelor. Studiul propus se referă la două aspecte importante în studiul mentenanței. Acestea se referă la: viziunea globală asupra managementului mentenanței şi a mentenanței condiționale, pentru care se prezintă şi un studiu de caz în incinta unui turbomotor. Pentru o mai bună înțelegere trebuie să se analizeze principalele metode şi filozofii în implementarea mentenanței.

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