

ROLE AND IMPORTANCE VIBRODIAGNOSTICS IN MAINTENANCE TECHNICAL SYSTEM

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ABSTRACT

The progress of computer and measuring techniques, and continuous price reduction of development of computer hardware, allows today a significant step forward in monitoring and diagnosis of technical systems with financial investment is very acceptable. The application of modern systems of technical diagnostics, can be coupled with analytical methods, much better to explore the dynamic behavior of machines. Thus, one can timely detect errors in operation, following the change of state machines, then set depending on the operating modes, failure to diagnose the causes of the events and store all relevant information about the state of the system. Such monitoring machines in the manufacturing process allows it to every moment I have access to the health of the machine, so that we can "to manage machines in general" which is an important prerequisite for the optimization of the production process as a whole.

Keywords: vibrodiagnostics, rotary machines, maintenance

1. INTRODUCTION

With the advent of increasingly complex and demanding technical systems is becoming crucial need for the development and application of appropriate diagnostic system to provide high availability and reliability of these systems. Direct supervision and diagnostic analysis of the situation, with the specified diagnostic methods, we get good insight on the current state of technical systems and the maintenance actions carried out when needed.

Diagnose the operating mode represents a multiple measurement and analysis of the response to output signals from which to infer the character of the dynamic behavior of the system and determine the cause of malfunction. I have a diagnostic approach based on the fact that any dynamic disorder caused by the movement or vibration is exactly determined character.

2. MONITORING SYSTEMS

In order to have available the necessary information for diagnostic assessment and analysis of technical systems there must be systems for the collection of all relevant data. With the existence of a system for collecting and analyzing relevant data, there must be an organizational management system machines that clearly defines who gets to see what information and who comes to the appropriate decision. Permanent monitoring of vibration can be easily designed if the monitored level of vibration (usually the level of vibration velocity) with an additional built-in relays that can signal exceeding a preset level of vibration. More complex than monitoring vibration monitoring vibration on the bearings and shaft, followed by phase angle of vibration with respect to the shaft and has additional capabilities of monitoring process parameters of the machine.

Supervisory instrumentation is likely to signal analysis and conditioning, and communication with the computer and expert systems, other than the protection of performing diagnostic tests which reveal the cause of the defect and provide measures to eliminate it.

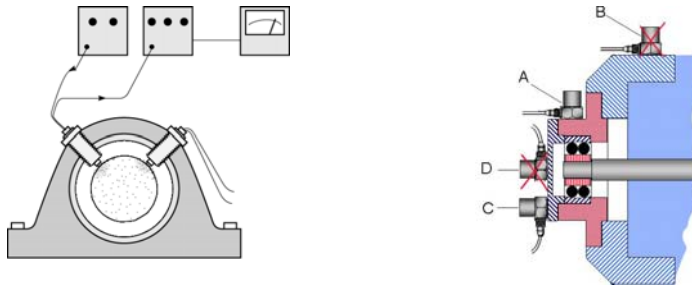


Figure 1. Eddy Current Proximity Probes and Choosing a Mounting Position



Figure 2. Ways of monitoring the implementation of diagnostic systems

3. VIBRODIAGNOSTICS

Occurrence of certain faults machine produces a fixed excitation power that produces a specific oscillatory movement. The analysis of vibration response with sensors system can determine the character of excitation force and determine the cause of machine malfunction.

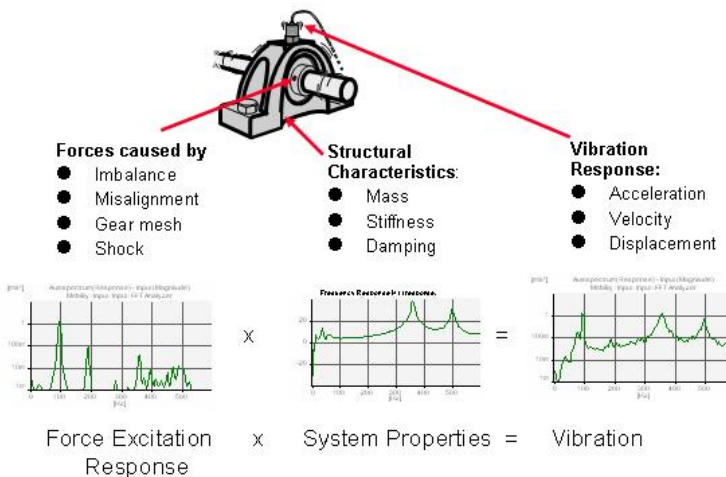


Figure 3. Dependence of vibration excitation force

Vibrodiagnostic methods used in detecting the cause of the problem in the work of mechanical systems are:: 1- **time picture of signals**, 2- **measure overall of vibrations** (velocity, acceleration and displacement), incorporated ISO 10816 standard, 3- **spectrum analyzes** in option zoom, 400 line spectrum and measure range 0,5 Hz - 40 kHz, 4- **envelope analysis**, 5- **cepstrum analysis**, 6-**CPB analysis**, 7- **order analysis**, 8- **DC analysis**, 9- **orbital analysis**, 10- **acoustics analyzes**, 11-**modal analyzes**

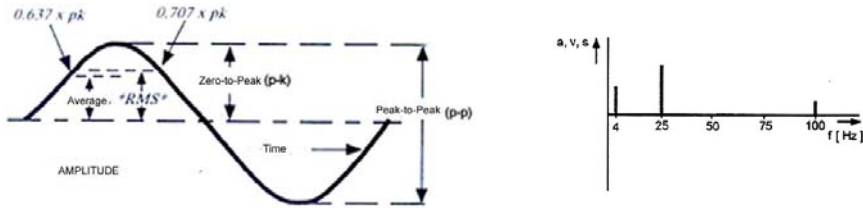


Figure 4. Overall of vibrations and Frequency spectrum

4. MEASUREMENT RESULTS

This is presented practically identifies the cause of dynamic problem that occurred in machines in real conditions of exploitation.

1. Thermal Power Plant Gacko
2. Plant: Pump

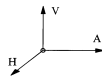
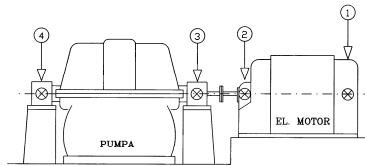


Figure 5. Show plant pump

3. Data and time measurement: 25.03.2011 in 11:30
4. The results

- Overall of vibrations

Table 1. Overall of vibrations in pump bearings

Bearings	Horizontal	Vertical	Axial
	$\sum v_{RMS}$ [mm/s]	$\sum v_{RMS}$ [mm/s]	$\sum v_{RMS}$ [mm/s]
1	1,6	1,2	1,8
2	1,2	1,1	1,3
3	1,9	2,1	1,5
4	3,2	3,1	1,2

EVOLUTION MACHINES

Evolution from in ISO 10816 standard: permissible.

- Spectral analysis

Let's show spectral plot horizontal vibration in 4-th bearings.

Damage characteristic frequency for SKF6318: BPFO= 38,6 Hz, BPFI=61,2 Hz; BSF=26,1 Hz; FTF=4,75 Hz, frequencies hydraulic damage BPF=75 Hz, for RPM=1500.

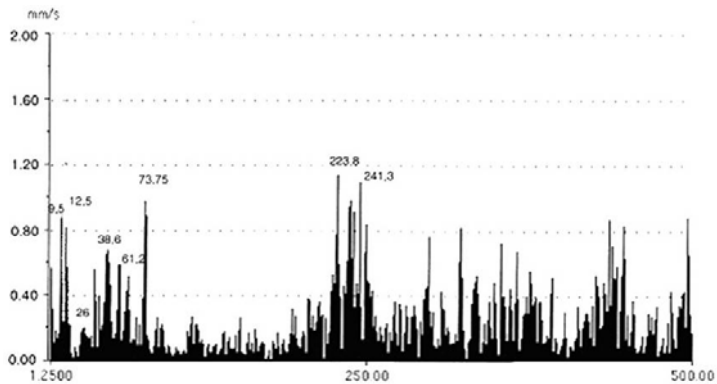


Figure 6. Spectrum plot horizontal vibration for 4 bearings

This is spectrum plot which shows detection of damage in rolling-element 4-th bearings.

5. CONCLUSIONS

The development of microprocessor technology, and on it based digital signal processing allows you to build current diagnostic monitoring system, which shakes and other diagnostic signals are processed almost in real time. So organized supervision can remember to find out:

- when and where the damage occurred (technical diagnostics)
- to assess how the injury continues to evolve over time, and estimate the time to definitive failure (technical Forecasting)
- to determine the cause of failure (technical genetics)

Management of machines represents a continuation of condition based maintenance with greater use of modern diagnostic systems that regularly collect relevant data and provide analysis of these data are presented in forms suitable for interpretation.

6. REFERENCES

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