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DETECTION DYNAMIC PROBLEM IN ROTATION MACHINES

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ABSTRACT

Dynamic problem is typical for certain group of machines, depending on their power, rotation, construction, base etc. Using standard ISO 10.816 all machines are classified in 4 classes and each class of machines has its recommended and allowed level of vibration, measuring points for vibration, the way of measurement and the selection of parameters for measurement.

Vibration measurement and analysis have acquired special significance, because they provide a large amount of quality information with a low capital investment. Existing vibrodiagnostics metods wich are development on existing analyzers vibration of leading word companis, are researched end qualityed. Which method to choose in an individual case is determined not only by the construction of the machines to be investigated, but is mainly dependent on the expenditure commitment and the depth to which machine diagnosis will be utilized.

This papers following the possibility of animated presentation in detection of dynamic problem through appropriate vibrodiagnostic formats is explored.

Keywords: dynamic problems, vibrodiagnostics metod, detection

1. INTRODUCTION

Modern world is inconceivable without electric current, oil, chemical or process industry. In order to produce all that the most important role is given to rotary machines. We should keep in mind that today's rotary machines can develop enormous power (even over 1000 MW), that they make rapid revolutions (even over 50000 revolutions a minute), and that process parameters (pressure, temperature) are very high and they processing very explosive and toxic media. For all we've said it is necessary to understand and predict possible disorders in the work of rotary machines. Modern resources (vibration sensors, devices for collecting dynamic and static data of machine, computer programs for analyses of vibration signals and converting them into appropriate formats, dynamic models of machines…) enable tracking and quantification of dynamic parameters in the work of a machine. By analyzing the dynamic behavior of rotor (or the whole machine) it is possible to predict damages connected to rotor or other parts of the machine and to eliminate them on time.etc.

2. DYNAMIC PROBLEM IN MACHINES

Dynamic problem is typical for certain group of machines, depending on their power, rotation, construction, base etc. Using standard ISO 10.816 all machines are classified in 4 classes and each class of machines has its recommended and allowed level of vibration, measuring points for vibration, the way of measurement and the selection of parameters for measurement. Analyzing certain causes of dynamic problems, we can conclude that the certain causes are typical for two types of machines:

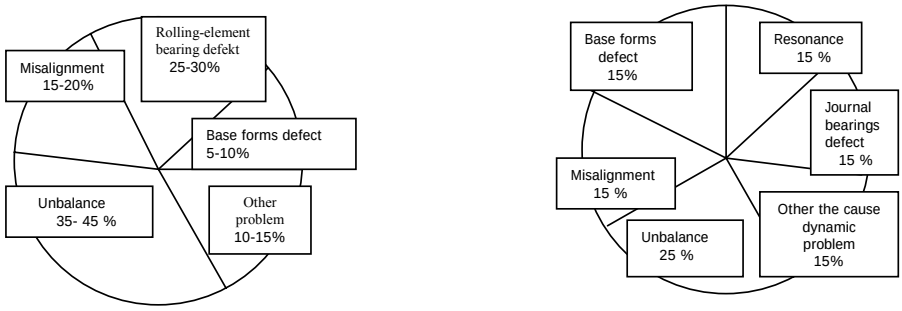
- GROUP 1
  - Machines classes I – in according ISO 10816
  - Machines classes II - in according ISO 10816

Characeristics of this group machines has owning rolling-element bearings.

- GROUP 2
  Machines classes III - in according ISO 10816
  Machines classes IV - in according ISO 10816

Characeristics of thise group machines has owning journal bearings

Picture 1 presents possibility of certain defect appearance in machines [2].



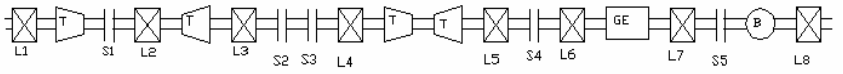
Picture 1. Possibility of certain defect appearance in machines Group 1 and Group 2

3. DETECTION OF DYNAMICS PROBLEM

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

3.1. Diagnostics of turbine

1. Thermal Power Plant Gacko
2. Plant: turbine



Picture 2.Show plant turbine

3. Data and time: 23.02.2006 in 18:30
4. The results

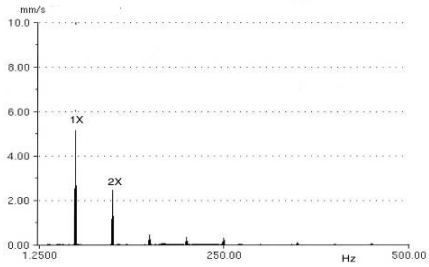
- <u>Overall of vibrations</u>

Table 1. Overall of vibrations in pump bearings

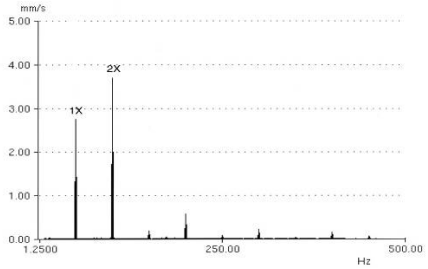
Bearings	HOR $\sum v_{RMS}$ [mm/s]	VER $\sum v_{RMS}$ [mm/s]	AX $\sum v_{RMS}$ [mm/s]
1	3,4	1,8	1,8
2	2,1	1,8	2,1
3	1,4	3,6	2,2
4	2,0	1,9	2,3
5	3,2	2,7	2,1
6	3,3	4,6	6,5
7	3,8	5,8	9,3
8	6,4	5,2	4,1

Evolution from in ISO 10816 standard: permissible.

- Spectral analyzis



Picture 3. Spectral plot vertical vibrations in bearings 7

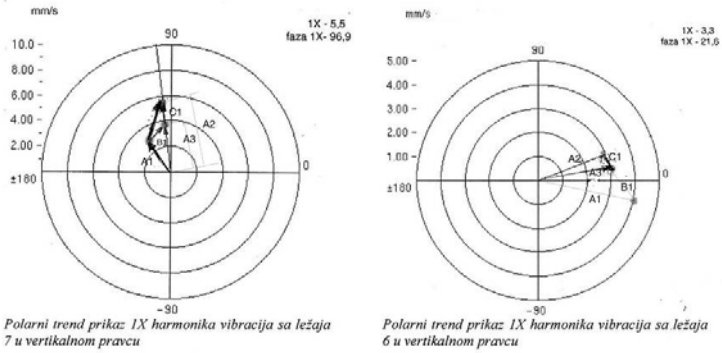


Picture 4 . Spectral plot vertical vibrations in bearings 6

From the spectral plot dynamic damages can be identified: unbalance and misalignment.

- Polar plot

Let's show Polar plot 1X harmonic vibration in 6-th and 7-th of bearings, various in parameters process.

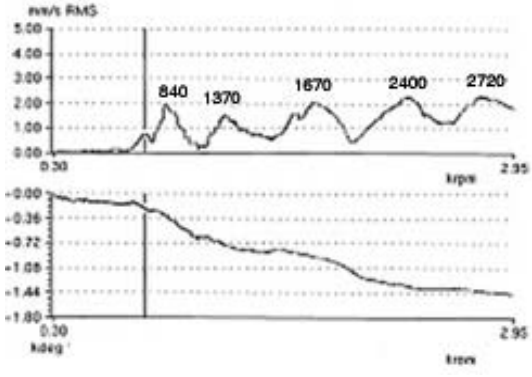


Picture 5. Polar trend plots of 6 and 7 bearings

From the Polar plot we can see change of amplitude and phase 1X harmonics vibrations.
We can see B1- vector thermal unbalance, C1- vector asymmetric magnetic field.

- Bode plot

Let's show Bode plot 1X harmonics vibration during start-ap machines in 1-st bearings.



Picture 6. Bode plot

We can see resonance frequencies turbine: 1- 840; 2- 1370; 3- 1670; 4- 2400; 5- 2720.

4. CONCLUCION

The digital signal processing based on new microprocessor technology allows us great success in machines protection, with very acceptable economic investments today. Additionally, including vibration-diagnostics monitoring of machines in addition with analytics methods, it is possible monitoring and quantification dynamics parameter of machine. By means analysis dynamics behavior of rotor, it is possible diagnostics defect which relating on rotor and other parts of machine, and solve it.

In last time, vibrations analysis and monitoring are become the most wide spread and softest part of machines diagnostics. Detection, identification and removing of problems about work of machine is simpler if we modeling few dynamics solution.

5. REFERENCES

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