ON PREDICTIVE CONTROL USING VIBRATION DETECTION METHOD ON CONDESATION DAMAGE TO THE MACHINE WITH SINGLE STAGE CENTRIFUGAL PUMP

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Article history:
Received: 10.06.2013; Accepted: 20.09.2013.

***Abstract**:Predictive maintenance is a maintenance system that is based on the possibility of predicting the time of failure of one system by tracking the variation of certain sizes, which at one time constitutes, signature" of that machine. Industrial applications preferably use vibration analysis method*

Keywords:control, pump,vibration,predictive

INTRODUCTION

Centrifugal pumps are fitted in petrochemical highest proportion of condensation. It is quite difficult to obtain data on seal failure. Manufacturers determine the degree of wear condensation by testing different combinations of materials for the products pumped to obtain levels of intensity of wear or environmental sustainability expressed by the seal.
The process of aging is a dynamic process, depending on many factors and time. For this reason must be considered periods of operation and often only by setting in front of the various stages can be obtained on the mechanism and process relationships wear.
The face seal assembly operates centrifugal pump consists of the drive shaft equipped with the pump sub-assembly in which the face seal and a clutch connecting the electric motor which drives the pump [3]. The most petrochemical units have been replaced by maintenance required planned a predictive maintenance. This involves periodically to record operating conditions of pump devices that record the spectrum. By analyzing computer processing many types of failures that can occur in the pump assembly - bearing - front seal - clutch - electric motor. These types of failures are: unbalance, misalignment of shafts, coupling defect, improper lubrication, faulty bearings, cavitation, turbulent flow [3]
Predictive Maintenance is a maintenance system that is based on the possibility of predicting the time of failure of one system by tracking the variation of certain sizes. In industrial applications, especially in the petrochemical industry has preferred to use vibration analysis method. Activity vibration analysis is usually done in the maintenance department or safe operation centers, where we quantify the reliability of equipment.
Along with control faults causes through predictive maintenance, reliability program should be made to determine and diagnose faults, and to order the commencement of maintenance actions to remedy the situation or at least draw attention to the risk to continue operating under these conditions.

PREDICTIVE CONTROL USING VIBRATION DETECTION METHOD USING SINGLE-STAGE CENTRIFUGAL PUMP MALFUNCTIONS AT

Vibration measurements performed on the pump bearings revealed increases to the previous measurement, vibration alarm entered in the field (as measured 16.1 mm / s). From this point was begun

Careful monitoring of the machine, from the point of view of vibration and operating parameters. This can see below the list of measurements for each point [3] of the machine:

Point	Direction	Value	U.M.	Change
1	Horizontal	,073	g's	
1	Horizontal	1,65	mm/sec	--
1	Vertical	1,59	mm/sec	--
2	Axial	2,33	mm/sec	--
2	Horizontal	,088	g's	--
2	Horizontal	1,83	mm/sec	--
2	Vertical	1,56	mm/sec	--
3	Axial	9,92	mm/sec	--
3	**Horizontal**	**1,437**	**g's**	**--**
3	**Horizontal**	**16,18**	**mm/sec**	**--**
3	Vertical	15,44	mm/sec	--
4	Horizontal	1,237	g's	
4	Horizontal	6,92	mm/sec	--
4	Vertical	9,06	mm/sec	--

Figure 1. List before remedying fault vibration measurements

Spectral analysis performed showed higher wear in the pump bearings. The spectrum analyzed, one can see large amplitudes at high frequencies between 40000-60000rot/min (eg 7.48 mm / s at 46080rot/min).

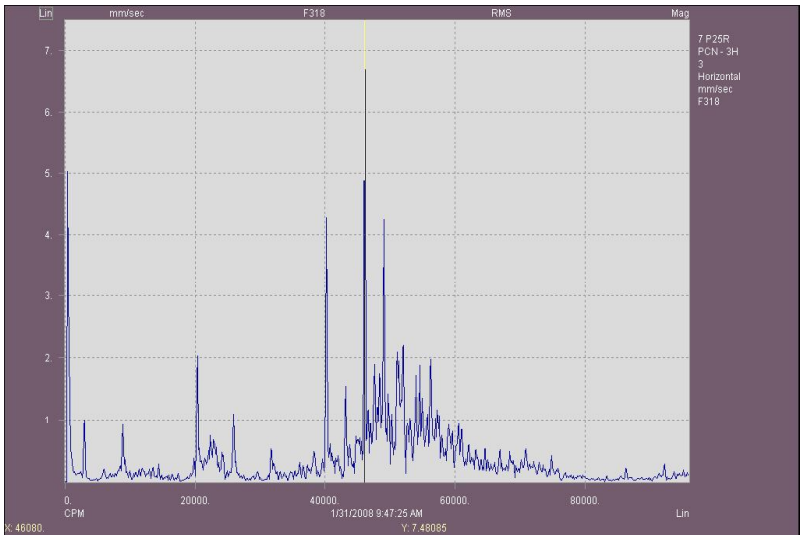

Figure 2.Spectral analysis before the fault rectified

Also observed an increase in the value of g / SE up to the value of 1,437 (spice energy - the energy developed by the bearings during operation) far above the alarm, another indication that the pump bearings pose problems.
When removing the pump was found that the bearings were damaged, requiring the replacement.

After replacing the bearings, vibrations measured values showed a decline in the level of vibration of from 16.18 to 1.85 mm / s, and a decrease in the value of g / SE from 1.437 to 0.31, as can be seen the measurement sheet, Figure 3:

Point	Direction	Value	U.M.	Change
1	Orizontal	,037	g's	
1	Orizontal	,912	mm/sec	--
1	Vertical	1,01	mm/sec	--
2	Axial	1,01	mm/sec	--
2	Orizontal	,064	g's	--
2	Orizontal	1,32	mm/sec	--
2	Vertical	,909	mm/sec	--
3	Axial	1,11	mm/sec	--
3	**Orizontal**	**,303**	**g's**	**--**
3	**Orizontal**	**1,85**	**mm/sec**	**--**
3	Vertical	1,61	mm/sec	--
4	Orizontal	,352	g's	
4	Orizontal	1,28	mm/sec	--
4	Vertical	1,09	mm/sec	--

Figure 3. List vibration measurements after fault rectification

When commissioning the spectral analysis performed (see spectra below) also revealed no large amplitudes at high frequencies, which shows that the defect was correctly diagnosed and removed, Figure 4

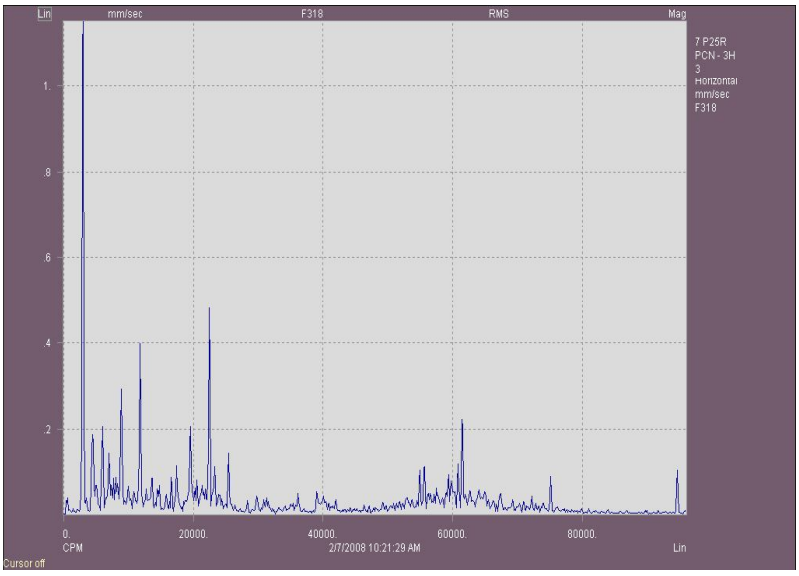

Figure 4. Spectral analysis after fault rectification

Attached to a vibration trend developments before surgery and after surgery. Note the disappearance of large amplitudes at high frequencies the last spectrum (top right) and the evolution of "down" the overall vibration after repair value (lower right), Figure 5

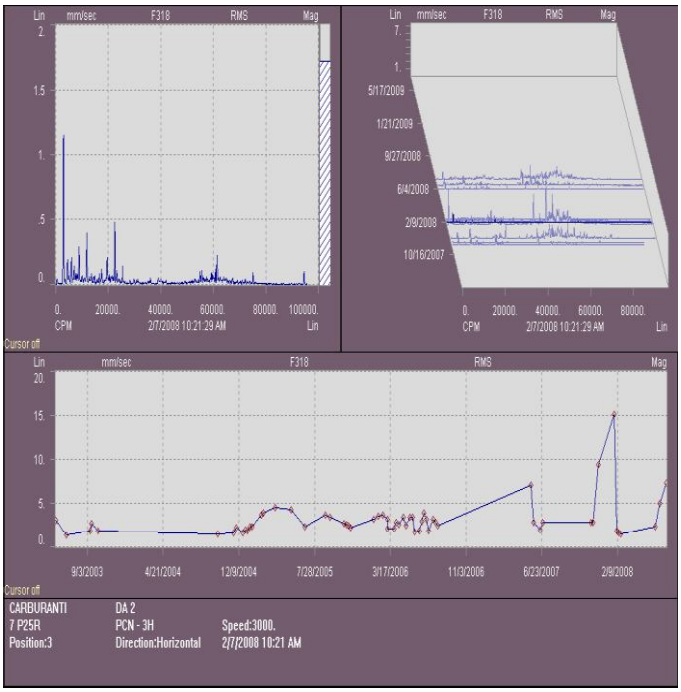

Figure 5.Evolution of vibrations before / after repair

The main cause of failure was bearing wear. Large vibrations at high frequencies have led to damage the seal. Pump repair was to replace the bearing and seal figura6

Figure 6 Seal7P25A

In operation appears not wear but one kind of overlap several types of wear These forms must be tackled through normal processes, design, selection of materials and finding compromise solutions.

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