A PAPER ON INCREASE BEARING LIFE OF ROLLING MILL

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ABSTRACT

Rolling mills works under heavy axial and radial loads on shaft which tends to causes failure, deflection and misalignment of bearing. To overcome the problem of these above maintained failure we changed the design of bearing. Spherical bearing can withstand these loads and also life of this bearing can be increased by improving proper lubrication between moving parts and decreasing hammering effect. These methods and changes can be implemented to overcome the bearing failure and increase bearing life. Thus it will help to reduce the maintenance cost of bearing changing and also increase the productivity of industry.

Keyword: - *Rolling Mill, Radial Force, Bearing, Bearing Life*

1. INTRODUCTION

A spherical roller bearing is having very high radial load carrying capacity due to line contact between roller and outer race. Spherical roller Bering is more rigid than ball bearing. Bearing no. 23072 have been applying to the auto accessories and machineries like rolling mill, crushers etc. relying on the advantages of precision manufacture technology, thus it gets consistent approval in the manufacturing application field. The comparative study of healthy and defective bearing will helps in condition monitoring of the bearing and with help of this we can predict the probable life of bearing. As we predict the life of the bearing the defective bearing will be replaced before it completely fails and we reduced the breakdown time of the machinery. The finite element modeling can be effectively used to differential how much load is acting on bearing. A finite element model simulation for analyzing vibration response of a bearing has been developed. A dynamic loading model simulates the load acting on the bearing due to transfer load from the ball. The roller bearing is tested at constant speed of rpm with spherical roller bearing A dynamic loading distribution is developed to simulate the load distribution on the bearing due to load transfer from the shaft through the Rollers.

2. LITERATURE REVIEW

[1] Pratik Patadia, Dr. Pranav had done the Fatigue life analysis and its improvement of bearing used in hot rolling mill. In this Work Cylindrical roller bearings with Deep end cavity rollers are advantageous in applications where load and speed are major considerations in the operations of the bearings. An improvement in load distribution and thus load capacity may be realized, as well as contact stress is also reduced considerably by using a bearing with Deep end-cavity rollers. This bearing is basically used in rolling mill where heavy load is applied on bearing. Deep end-cavity roller is proposed for rolling mill bearings with a view to reducing the contact stress distribution for life improvement. Deep end cavity rollers are one of the advanced concepts used to eliminate the sharp edge-stresses at the apexes of the roller. The main objective of this work is to enlighten the engineers to make use of deep end cavity rollers to increase load carrying capacity and improvement of fatigue life.

[2] Pranav B. Bhatt, Prof. N.L. Mehta had done Design, Modeling and Analysis of a Single Raw Four Point Angular Contact Split Ball Bearing to Increase its Life. In this work An angular contact ball bearing uses axially asymmetric races. Angular contact bearings better support "combined loads". It achieves this by using at least two races to contain the balls and transmit the loads through the balls. In most applications, one race is stationary and the other is attached to the rotating assembly (e.g., a hub or shaft). As one of the bearing races rotates it causes the balls to rotate as well. This kind of bearings can be used in transmissions. In this paper four point angular contact ball bearing is designed and analyzed which is used on propeller shaft of aircraft. As a result life of bearing can be calculated this is less because of very high speed.
[3] Deshpande hrishikesh, Prof.s. kulkarni, Prof. B.S. Gandhare had done Investigation on Effect of defect on Cylindrical Roller Bearing by Experimental and FEA approach. In this work Rolling element bearings are commonly used components in machinery for a wide range of applications. This work represents investigation of performance of cylindrical roller bearing. In this work lateral defect on outer race is focused and size of defect is varied during experimentation. Radial load and RPM are varied within specified range and experimental vibration signals were obtained. Vibration signals analysis has been carried out in time domain by FFT analyzer. Results of experimentation were benchmarked by using Finite Element Analysis using ANSYS. Results show that as defect size and RPM increases there are sudden increase in amplitude of vibration up to 1500 RPM. There is 51%of increase was observed in amplitude of vibration at 1500 rpm in defective bearing as compared to healthy bearing The actual measurements of vibration signals for healthy, defective bearing has been carried out by using FFT analyzer and time domain signal analysis has been done in comparative manner.
[4] S.N. Aloni, N.D.Dhote, T.G. Lokhande, D.G. Madiwale had done An Investigation and Rectification on Failure of bearings of Casting Shakeout Used in Foundry. In this Work deals with investigation and rectification on failure of bearing of casting shakeout, required in foundry industries to separate solidified casting and sand from mould box. The failure of bearings is mainly due to brinelling tends to create cavities on the bearing raceway. This result in roller and inner races surface of spherical bearing get damage. The rectification of existing system uses four bearings as modified setup of existing system to distribute the load acting on shakeout aims at reducing this frequent breakdown, increases life of bearings and increases the productivity of plant.

3. CONCLUSION

[1] On basis of this study it can be concluded that it is aimed at presenting the cylindrical roller bearing with Deep end cavity roller in various fields and the research and development conducted to improve technologies that will directly benefit the Rolling mill industries and other industries. Using of 4-row cylindrical roller bearing in place of 2-rowspherical roller bearing is beneficial for us to reducing the contact stress distribution for improvement in load carrying capacity because of this improvement in life of the bearing.
[2] In analytical design, by increasing numbers of ball, decreasing ball diameter, and changing the contact angle, the life in working hours can be increased. From the results of analytical design and analysis it can be seen that life of bearing is nearly same in both cases. Due to higher stresses, the life in working hours is limited to hours. It can be further increased by changing the parameters, material and lubrication of the Bearing.
[3] Bearing failure is one of the main causes of interruption of rotating machinery operation. This generally leads to unscheduled shut down thereby increasing the cost of operations. One of the major concerns in bearing diagnostics is the detection of the defect at its incipient stage and subsequently alerting the operator before it develops into a catastrophic failure.1. Hence it is concluded that, the outer race defected bearings has higher amplitudes of vibration in comparison with healthy bearings for the same speed. The RMS value of healthy bearing decreases slightly after 1500 rpm. 2. At constant defect size and constant load with different speeds of rotation, amplitudes of vibration varies with increase in speed.
[4] In this work, investigation on bearing failure of shakeout used in foundry industry is performed. After investigation, it is revealed that, the failure of bearing mainly occurs because of impact load acting repeatedly and is brinelling. This reduces life of bearings. The modifications are suggested in existing set up, which improve the bearing life ten times than that of in existing setup.

5. ACKNOWLEDGEMENT

With a deep sense of gratitude, I wish to express sincere thanks to our honorable guide Mr. Ganesh Mudaliyar [Mechanical Department, SCET] who has the attitude and substance of a genius and has been a great source of inspiration through the paper work.

6. REFERENCES

[1]. Pratik Patadia, Dr. Pranav, A review Paper on Fatigue Life Analysis and its Improvement Of 4 row cylindrical roller bearing used in hot rolling mill, IJREAT- Volume 33 ,Issue 2, April- May 2015
[2]. Pranav B. Bhatt, Prof. N. L. Mehta, Design Modelling and Analysis of a single four Point angular contact split ball bearing to increase its life. IJETT –Volume 4, Issue 6, June 2013
[3]. Deshpande Hrishikesh, Prof.S.S.Kulkarni, B.S.Gandhare Investigation on Effect of defect on Cylindrical Roller Bearing by Experimental and FEA approach, IJETAE – Volume 4, Issue 6, June 2014
[4]. S.N. Aloni, N.D. Dhote, T.G. Lokhande, D.G. Madiwale An Investigation And Rectification On Failure Of Bearings Of Casting Shakeout Used In Foundry Industries. International Journal of research in Engineering and Technology.