



# Effect of TiO<sub>2</sub> Nanoparticles Blended with Lubricating Oil on the Tribological Performance of the Journal Bearing

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Plain Journal Bearing  
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 Wear scar diameter

## ABSTRACT

*This paper presents the performance analysis for plain and elliptical journal bearing operating with industrial lubricants. Titanium dioxide nanoparticle of size 40 nm is used as a lubricant additive to examine the performance of the bearing. Comparative analysis is carried out for three different lubricants with titanium dioxide (0.5% wt) nanoparticles. Performance of bearing is measured at speeds ranging from 500 r.p.m. to 1000 r.p.m. and at 1000 N load. The study of antiwear and antifriction properties for lubricants is carried out on four ball Tribo-tester for operating conditions specified by ASTM standards. An influence of titanium dioxide as an additive on the performance characteristics of the journal bearing such as pressure distribution, load carrying capacity, attitude angle, power loss, oil flow rate, side leakage, frictional force and temperature rise in a film is examined in this paper. The elliptical journal bearing improves the performance of a system over plain bearing operating with the same lubricant.*

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## 1. INTRODUCTION

Hydrodynamic bearings are familiar parts of rotating machinery. Journal bearings endow with a cylindrical bearing face on which the shaft running through the bearing lies. The study of journal bearings has concentrated on various features of engineering. The concept of hydrodynamic journal bearing can be found in many areas of the study of stress, material composition, the behavior of the fluid, applied thermodynamics, vibration, and instrumentation.

So many researchers are carrying out a research on the stability analysis of the journal bearing system, as it is the crucial area of the dynamics. Nevertheless, the concept of instability created by oil whirl is not intelligible. This needs a clear understanding of the oil whirl and whip phenomenon to identify the valuable fault of a system. The structure of hydrodynamic journal bearing due to this effect is observed as shown in Fig. 1 that is used for the steam turbine in thermal power plant situated at Eklahre, Nashik, India.