Performance Analysis and Optimal Design of Hydrostatic Bearings

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ABSTRACT

The purpose of this thesis is to research and design the hydrostatic bearings use of "single pump with constant resistors". Besides the analytical simulation , a optimal program of this type bearings will be developed. To analyze of the hydrostatic bearings performance will be based on the simulation of the pressurized lubricant film for the journal and thrust bearings. By using this software , one can analyze the parameters (considered from the view points of the bearings geometry , hydraulic resistance , stiffness of the oil and lubricating oil gap , etc.) to understand their effects on bearings characteristics. In addition , the energy consumption of the hydrostatic bearings which is dependent on the frictional work done and the work done by the pump will also be discussed. On the developed program will be assumed that the minimum the energy consumption and hence the heat generated by the bearings , the total power loss must be kept as low as possible. The programmer enable a very wide range of journal and thrust bearings systems to be dealt with and can be made to yield information on improvement to the design. Finally , a prototype of a spindle system will be machined and its assembly as well as some measurements were also finished. The results of this study may be useful for design a spindle system with hydrostatic bearings.

Keywords : hydrostatic bearing ; oil film ; stiffness ; oil pocket ; lend ; optimal

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