Aerostatic bearings for energy efficiency in paper and board machinery

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Abstract

Friction is a significant factor in paper and board machinery. Friction losses in bearings account for approximately 10% of the total electrical energy consumption of an average paper machine; while other sources of friction, such as seals, gears, and sliding contacts, account for approximately 22% of the electrical energy consumption [1]. Improvements in the energy efficiency would have a significant impact on a global scale due to the large energy consumption of the paper and board machines.

Currently, the roll systems mainly utilize rolling element, hydrostatic and hydrodynamic bearings. As the production demands are ever increasing, the production speed and width of the machinery have been increasing. The increasing speeds translate to increasing friction in the oil lubricated bearings, where the viscosity of the lubricant is limiting the potential for friction reduction to just incremental development. In order to reach significant improvements in the energy efficiency, new concepts are required. One such concept is to implement aerostatic lubrication to the most energy intensive roll systems [2].

The present study investigates the feasibility of a concept paper machine roll with aerostatic lubrication from the perspective of energy consumption. The concept is benchmarked against current industrial systems with a hybrid of hydrostatic and hydrodynamic lubrication.

References

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