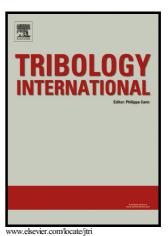
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ACCEPTED MANUSCRIPT

Energy efficiency tests in a full scale wind turbine gearbox

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Abstract

A 850 kW wind turbine gearbox, widely used in wind farms, was used to perform efficiency tests of different wind turbine gear oil formulations.

One mineral and three polyalpholephin commercially available lubricants were chosen, all them are ISO VG 320 wind turbine gear oils.

Study the influence of different gear oil technologies in the overall gearbox transmission efficiency is the main objective of this work.

The results show that different energetic efficiency as well as different oil particle counting were obtained even when the same base oil is used.

Keywords: wind turbine gearboxes, gear oils, additives, efficiency

1. Introduction

Renewable energies, due to concern over the environment, represent a new path into world sustainability [1–4]. Wind is considered to be one of the most effective and one of the world's fastest-growing renewable energy sources [5]. One of the reasons is that wind is an infinite and free source of energy with no harmful waste products.

Wind turbines are those which convert the kinetic energy present in the wind to mechanical energy. The blades of a wind turbine rotate at very low speeds, typically 20 revolutions per minute, which are not suitable for conventional power generation using an electrical generator. This constraint is solved using a multiplying gearbox between the hub and the electrical generator [6, 7].

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