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Study on design and material selection of a Spur Gear pair utilized in renewable energy devices

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Abstract

The main aim of this project is the modeling and the studying of the static stresses on spur gears of different materials for a mechanical solar tracker. It is worth mentioning that, Solar energy is a vast source of directly usable energy in order to generates other energy resources such as biomass, wind, hydropower, and wave power. Solar power is the major primary source of energy that can meet human needs in the future. Furthermore, Gears are mechanisms that transmit rotary motion from one shaft to another by matching up teeth together. In a mechanical power transmission unit and their durability led to their selection as a mechanical component in the tracking mechanism. this project dedicated investigation on design and analysis of two important characteristics of gears, e.g. the radius and the number of teeth.

Key words: solar energy, Gear, spur gear, energy harvesting, renewable energy

1. Introduction

Various solar tracking mechanisms have been designed and implemented by various designers around the world in order to reduce the cosine losses of incident radiation on solar panels. The face of the solar panel or reflective surfaces of a typical solar tracking system is adjusted to align with the sun as it moves across the sky. Every day, the system completes one rotation.

The tracker's construction is divided into three sections: mechanical, computer science, and electronics and electrical, in that order. The DC motors, worm gears, and the frame that housed the entire system make up the mechanical system. PV sensor, comparator circuit, and microcontroller make up the electrical and electronic system, which is then connected to the internet. Offered the cyclic dynamic and transient stresses built up in the tooth of the gear, the role of small spur gears in precise actuation for this purpose is critical. For this Job a pair of spur gear are usually used to drive a dual axis tracking system for simultaneous rotation around a vertical and horizontal axis.