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An exploration of the performance behaviors of lubricated textured and conventional spur gearsets

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ABSTRACT

This paper reports the experimental investigations on the performance behaviors of the conventional and textured gearsets. The vibration behaviors, temperature rise and surface topography of gearsets have been investigated for different loads (P_H) and pitch line velocities. The texture comprising of micro-cylindrical dimples of non-uniform diameter was created by chemical etching process on teeth surface. The vibration results obtained employing conventional and textured gearsets have been compared and analyzed in time and frequency domains. Moreover, the surface topography and temperature rise have been measured. Based on the experimental results, it is found that in the presence of texture on gear teeth, the vibration amplitudes, oil film temperature rise and teeth surface damage have substantially reduced.

Keywords: Spur gear, textured face and flank, vibration, temperature rise, SEM image.

1. Introduction

Gearsets play vital role in the transmission systems of industrial machines and vehicles (buses, trucks, earth moving machinery, loco-engines, cars, marine engines etc.). An efficient and long life gear transmission system reduces the operational costs of machines/vehicles. Gearsets are one of the major vibration sources in the transmission system. They can cause damage to structures and machine sub-assemblies resulting in malfunction, excessive wear, fatigue failure and deterioration of the performance and life of rotating machinery. It is worth highlighting here