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ENVIRONMENTAL IMPACT OF HIGH-PERFORMANCE SPUR AND HELICAL GEARS IN INDUSTRY

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Abstract

Environmental protection is increasingly becoming a major concern in public and international policies aimed at reducing carbon emissions. The manufacturing industry is under growing pressure to adopt environmentally friendly solutions while maintaining high productivity and efficiency.

Gears are among the most commonly used machine elements for power transmission. Their high efficiency, wide range of applications across multiple fields, and ease of maintenance contribute to reducing environmental impact. However, it is equally important to design and manufacture high-performance gears to meet technical requirements and ensure a longer lifespan.

To achieve this, simulating the behavior of gears under different working conditions is essential. The main contribution of this paper is the development of a computerized simulation program for contact stress analysis of spur and helical gears. This program aligns with modern environmental requirements, as various studies and statistics confirm that using simulation software in engineering significantly reduces environmental impact compared to conducting physical tests on prototypes in laboratories. Practical prototyping leads to increased energy consumption, resource usage and waste generation. The program allows users to configure all operating conditions and gear regimes, as well as modify the geometry of the teeth in contact. Additionally, designing high-performance gears enhances component lifespan, which in turn has a significant positive impact on the environment. A brief description of the simulation program is provided in this paper.

Key words: environment, gears, higher lifespan, simulation, sustainability

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