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Effects of Various Parameters of Micro-Geometry on Performance Characteristics of Gears

Sunil Pathak[1] and **Neelesh Kumar Jain**[2]
[1]Universiti Malaysia Pahang, Kauntan, Malaysia
[2]Neelesh Kumar Jain, Indian Institute of Technology Indore (MP) India

Gear is one of the most important mechanical elements, possibly even surpassing the wheel, of human civilization which is used to transmit motion and/or power mechanically and positively (i.e. without slip) with and without change in the direction and speed of rotation by the successive engagements of teeth cut on their periphery. Performance characteristics of a gear include its load carrying capacity, service life, operating performance, surface characteristics, wear characteristics, transmission characteristics and noise generation characteristics. All these are significantly affected by the surface characteristics of a gear which has two major components namely (i) surface quality which includes surface finish, micro-geometry (i.e. form and location errors), tooth flank topology and wear characteristics; and (ii) surface integrity aspects. The aim of the present work is discuss the effects of various parameters of micro-geometry on performance characteristics of a gear. Micro-geometry of a gear is evaluated in terms of form error and location error. Total profile error and total lead error are two components of form error while pitch error and run out are considered as two components of location error. Higher values of form error and location error in a gear lower its load carrying capacity and increases noise and errors in motion transfer during its use. In this paper authors presents a detailed description on the effects of micro-geometry parameters on performance of gears and also presents possible solution to avoid these flaws for noiseless and smooth performance of gears.

Biography

Sunil Pathak is specialized in gear engineering and advanced and hybrid manufacturing processes. He has been working in the field of gear engineering since last 7 years and advanced manufacturing and surface engineering over 5 years. He has conducted extensive research on advanced finishing of gears. He possesses specialized skills in gear finishing, gear metrology (micro, and macro-geometry) and measurement of gear accuracy. Presently he has been working in developing cold spray coatings as sustainable process for manufacturing of 3D additive manufacturing components and repair/remanufacturing engineering where he has specially gained experience in materials and remanufacturing engineering. He is also working on machining of difficult-to- machine materials using advanced machining processes such as EDM and WEDM. Dr. Pathak has published more than 15 International Journal Papers, 3 Book Chapters and 4 research articles in the proceedings of the international and national conferences

sunilpathak87@gmail.com

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