STUDY OF ASYMMETRIC INVOLUTE AND SYMMETRIC INVOLUTE SPUR GEAR TEETH PROFILE STRENGTH

Nama Mahasiswa : Mohamad Zainulloh Rizal
NRP : 21010 100 112
Departement : Teknik Mesin FTI – ITS
Academic Supervisor : Dr. Ir. Agus Sigit Pramono, DEA.

Abstract

Gear is a main power transfer in the transmission system. Currently, transmission system more like to use gear with symmetric involute profile (symmetric gear). On helicopter, gears receive great load and the direction is one direction. So, gear prone to failure. Gear with asymmetric involute profile (asymmetric gear) is developed to solve this problem. Rever to Alexander Kapalevich experiment that asymmetric gear will increase load capacity better than symmetric gear.

This project discuss about asymmetric gear and symmetric gear where is deferent to Kapalevich. The deferences our project and Kapalevich are this project use simulation instead of experimental and asymmetric factor that using is deferent. This project uses asymmetric factor (K) K=1, K=1.05, K=1.06, K=1.07 and K=1.08. The transient numerical simulation method by FEA Software is used to solve the problem. This simulation uses AISI 1045 for material properties. All model use pitch diameter 120 mm and module 4 mm. Meshing method that used is sweep, type is explicit and element is tetrahedron. Then, loading is done by tortion of 100 N.m, 150 N.m, 200 N.m, 250 N.m and by rotational velocity of 1000 RPM, 1500 RPM, 2000 RPM and 2500 RPM.

This project generates some conclutions. Asymmetric factor causes top of gear profile getting smaller and bottom of gear profile getting greater if it compares with standart gear. In
addition, maximum normal x axis bending stress for tortion load reduce 15.25% - 88.86%. maximum von mises bending stress for tortion load reduce 19.53% - 39.11%. maximum normal x axis bending stress for rotational velocity load reduce 0.89% - 63.3%. maximum von mises bending stress for rotational velocity load reduce 1.64% - 21.09%.

**Key Word**: Gear, Asymmetric involute, symmetric involute, torsion, rotational velocity, bending stress