April 05, 2018

ME351A - Design of Machine Elements
Design exercise No: 6

A helical gear set transmits 75 kW power with a speed ratio of 4. The pinion rotates at 1120 rpm. Use the following data: pressure angle: 20^o, number of teeth on pinion: 20, Quality number is 6, reliability desired: 0.9, pinion life: 10^8 cycles, ratio of rim thickness to tooth depth: 1.4. Both pinion and gear are made of Grade 1, through hardened steel with HB of 250. Assume accurate mounting with low clearances, uniform power source and driven machinery. Design the pinion for factor of safety of 2 against bending fatigue failure and a factor of safety of 1.4 against surface fatigue failure. Also calculate the factors of safety for gear.

Hint: see shigley's book solved example.