Team 15
Final Project Proposal
Mechanical Component Analysis and Design
April 3rd, 2021

Design of CBR 600 Gearbox Output Shaft and Bearing Selection

Our team intends to design a CBR 600 gearbox output shaft and select bearings for it. The primary function of the gearbox output shaft is to transmit engine power from the input shaft to the front sprocket with a range of gear reductions. Bearings need to rigidly hold the output shaft in place, keeping deflection below an acceptable limit from gear meshing while allowing smooth rotation. The shaft and bearings need to last the expected life of the engine without specific servicing.

The design variables consist of the material selection, dimensions, and layout of the output shaft, and bearing selection to meet the primary function and design objectives. The design objectives are threefold, minimize cost, minimize mass/moment of intera, and minimize packaging size; all of these are quite important in an entry level super sport bike engine.

Because only one gear at a time can be engaged, we intend to analyze each gear stress individually and find the limiting case for each. We intend to use dynamic fatigue failure theories as the output shaft will be under varying cyclical bending loads and a varying torsional loads throughout its life. The shaft and bearing have to survive enough cycles for the expected engine life. A factor of safety of 3 will be used on top of all the given analysis. Relevant design codes are ANSI/AGMA 6101-F19 for design of gearbox components and bearing allowable loads and speeds.

References

ANSI/AGMA 6101-F19
        https://webstore.ansi.org/standards/agma/ansiagma6101f19