

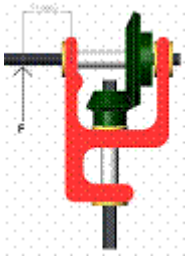
1. Tooth Strength Analysis

The gears you have been given for use in the gearbox have a material yield strength of 35,000 psi. Using the Bevel Gear Design Spreadsheet, estimate the maximum torque we could apply to the small gear, as calculated by both beam bending equation and the AGMA standard equation. Compare with the torque speed curve of the B&D motors, could the gears break?

2. Torque-Speed curve Measurement

Give a brief explanation of a quick and dirty experimental setup that you could use to determine the torque-speed curve of the output of the gearbox. Your setup does not have to be highly accurate, but it does need to provide quantitative results.

3. PV Bearing Calculation



A wheel is mounted 1 inch from bearing opposite the gear on the slow output shaft of the bevel gear-box. (See drawing) Assuming that you somehow manage to put the full weight of a 10 Lb. machine on the wheel, ($F=10$ Lbs.) while the B&D motor is running on the input shaft at maximum velocity (~ 325 RPM), determine the PV value for the bearing closest to the wheel. Based on acceptable PV values, is this a reasonable design?

The bearings are made of nylon (max continuous PV of approx. 5,000 psi-ips) and are 0.375" in diameter. The aluminum bearing surface is 0.25" thick. The distance between the two bearings on the slow output shaft is 1.9".