University of British Columbia

MECH 325 - Mechanical Design I

Assignment 1

Gear Train Design

GROUP C2

Team Member:	*Student Number:*
Kota Chang	12345678
Chuan Du	12345678
Donney Fan	12345678
Dvir Hilu	12345678
Michael Ko	12345678
Priyansh Malik	12345678
Darren Tong	12345678

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Velocity = 12345 mm/sec
Cost = $1245
Performance Metric = 12345 mm/$s

1 Summary

2 Appendix

2.1 Power Screw Analysis

The objective of this section is to find the minimum required torque and rotational speed needed to lift the 2500 kg load at 4 mm/sec.

The torque required to lift a load with gravitational force F is:

$$\tau = \frac{F d_m}{2}\left(\frac{l + \pi f d_m}{\pi d_m - f l}\right) \tag{1}$$

Parameters			
Symbol	Value	Units	Description
F	2500×9.81	N	Axial compressive force
d_m	57	mm	Mean diameter
l	6	mm	Pitch
f	0.08	N/A	Friction Coefficient

A torque of 79.5 Nm is required to lift the load where efficiency losses in the power screw is accounted for by the friction coefficient, f.

2.2 Motor Torque Analysis