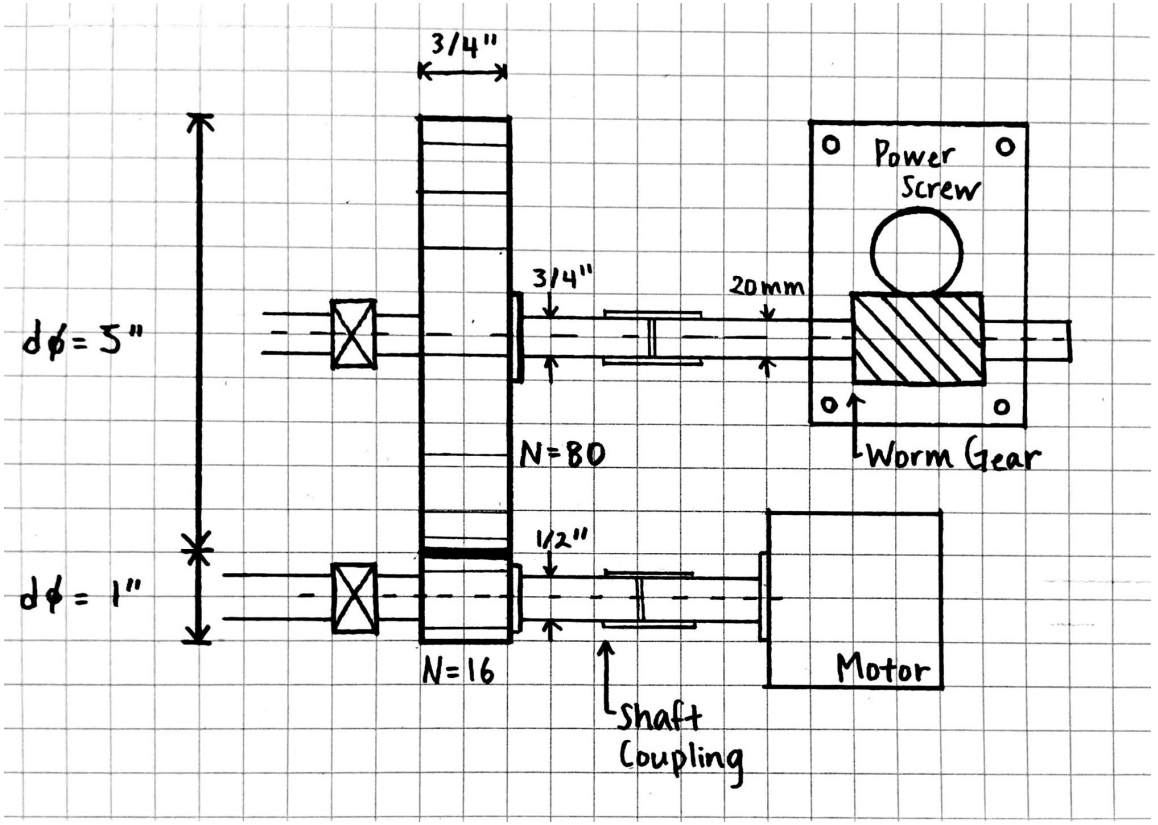
POWER SCREW LIFT SYSTEM – C2



Velocity = 5.9093 mm/sec
Cost = $256.69
Performance = 0.0230 mm/$s

- Two 1020 carbon Steel spur gear system
- 16 teeth pinion and 80 teeth gear
- Pitch diameters of 1in and 5in, respectively.
- Diametral pitch of 16/in

Key Assumptions

- Spurs efficiency 94%
- Temperature always below 120° C
- Appropriate shaft + shaft couplers + shaft bearings available
- Motor is small enough to fit within gear box
- Assume constant rotational speed for each element within the system

CALCULATED VALUES

Power Screw Calculations		
Raising Torque	79.55 Nm	Equation 8-1
Lowering Torque	32.41 Nm	Equation 8-2
Worm Gear Calculations		
Worm Gear Efficiency	80.34%	Equation 15-54
Worm to Nut Torque Ratio	1:9	Double threaded worm : 18 teeth nut
Gear Calculations		
Bending Stress Safety Factor	14.27	Equation 14-41
Contact Stress Safety Factor	5.37	Equation 14-42
Pinion Calculations		
Bending Stress Safety Factor	9.27	Equation 14-41
Contact Stress Safety Factor	2.41	Equation 14-42
Gear Train Calculations		
Overall Gear Ratio	1:5	Pinion teeth : Gear teeth
Part Cost	$116.47	Sum of gear costs
Motor Calculations		
Raising Torque	2.34 Nm	From power screw torque
Lowering Torque	0.95 Nm	From power screw torque
Raising RPM	2659 RPM	Calculated from motor curve
Lowering RPM	4050 RPM	Calculated from motor curve
Motor Runtime Cost	$140.22	Calculated by Time/cycle * cost/hour * total cycles