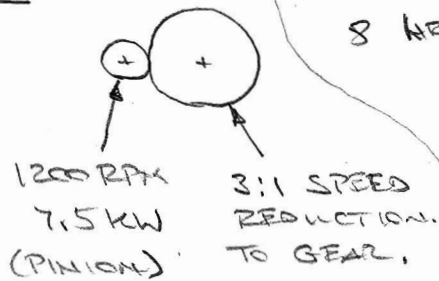


# MECH 153 - ASSIGNMENT 4

#1



20° PRESSURE ANGLE.

8 HRS/DAY, MODERATE SHOCK.

TABLE 20-17 → SF = 1.2

∴ REQ<sup>d</sup> POWER = 7.5 kW × 1.2 = 9 kW

FROM FIG. 20-24.

1200 RPM, 9 kW ...

MODULE = 4.23, N<sub>1</sub> = 16 TEETH.

$\frac{n_1}{n_2} = \frac{N_2}{N_1} = 3$

∴  $n_2 = \frac{1200 \text{ RPM}}{3} = 400 \text{ RPM.}$

THUS N<sub>2</sub> = N<sub>1</sub> × 3 = 48

ALSO PD<sub>1</sub> = MODULE × N<sub>1</sub> = 4.23 × 16 = 67.68 mm

PD<sub>2</sub> = MODULE × N<sub>2</sub> = 4.23 × 48 = 203.04 mm.

CENTRE DISTANCE =  $\frac{PD_1 + PD_2}{2} = 135.36 \text{ mm}$

#2

SMOOTH OPERATION, 10 MIN/DAY → T20-17 → SF = 0.7

MANUAL MACHINE: 800 RPM.

20° PRESSURE ANGLE.

MOTOR ①: 7 hp, 1200 RPM

MOTOR ②: 5 hp, 750 RPM

REQ<sup>d</sup> POWER = 7 hp × SF = 4.9 hp

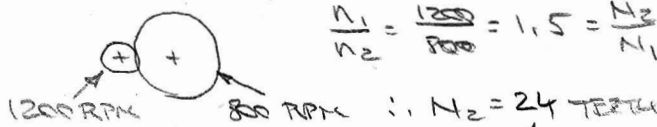
REQ<sup>d</sup> POWER = 5 hp × SF = 3.5 hp.

T20-24: 1200 RPM, 4.9 hp

T20-24: 800 RPM, 3.5 hp.

→ 8 PITCH, 16 TOOTH PINION

→ 10 PITCH, 20 TOOTH PINION.  
(JUST MADE IT!)



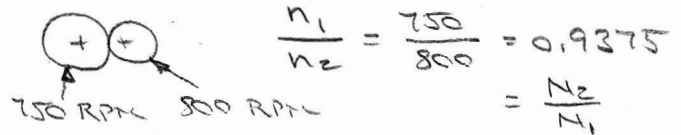
$\frac{n_1}{n_2} = \frac{1200}{800} = 1.5 = \frac{N_2}{N_1}$

THIS IS OK (ITS BIGGER THAN 16 TEETH AND AN INTEGER)

PD<sub>1</sub> =  $\frac{N_1}{DP} = \frac{16}{8} = 2''$

PD<sub>2</sub> =  $\frac{N_2}{DP} = \frac{24}{8} = 3''$

CENT. DIST =  $\frac{2 + 3}{2} = 2.5''$



∴ N<sub>2</sub> = 20 × 0.9375 = 18.75 TEETH.

NOT SO GOOD, ITS NOT AN INTEGER.

REVIEWING PAGE A-45 TABLE, 67/68 AND MESSING ABOUT WITH GEAR COMBINATIONS ...

15 TEETH = 0.9375 JUST WHAT WE WANT!

T20-24 SAYS WE SHOULD MOVE TO A 8 PITCH TO TRANSMIT THE POWER.

PD<sub>1</sub> =  $\frac{N_1}{DP} = \frac{16}{8} = 2''$   
 PD<sub>2</sub> =  $\frac{N_2}{DP} = \frac{15}{8} = 1.875''$   
 CENT DIST =  $\frac{2 + 1.875}{2} = 1.94''$

CONCLUSION: BOTH WOULD WORK AND ARE ABOUT THE SAME SIZE. FLIP A COIN!