PRELIMINARY

CALCULATIONS FOR 12 × 13 IN. CRANKSHAFTS

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CALCULATIONS FOR ALLOWABLE H.P

$$H_0 = \frac{K_2 n E}{5730 C K_1} \left[\frac{d^3 Z (\sigma_0 + 16)}{7000} - \frac{A K_2 P (L - 2p)}{100\,000} \right]$$

$n = 1$ $\quad d_p = 12 \times 25.4 = 304.8$

$P_0 = 450$ $\quad L = 13 \times 25.4 = 330.2$

$E = 0.55$ $\quad r = 0.75 \times 25.4 = 19.05$

$C = 5.E$

$A = 0.37$ $\quad d_j > d_p \therefore d = 304.8 \quad Z = 1$

$u = 12 + 13 - 21 = 4$ $\quad p = 1800 = 126.58$

$\lambda = 6.5529$

$$K_1 = 0.5 + \frac{4}{3 \times 12} + 0.243 \sqrt{\frac{12}{0.75}} = 1.8831$$

$$\frac{450 \times 1 \times 0.55}{5730 \times 5.2 \times 1.8831} = 0.028231.$$

UTS $\quad 695\ N/mm^2 = 70.87\ K_g/mm^2 = \sigma_0$

$$\frac{304.8^3 \times 1.0 \times 86.87}{7000} = 351\,412.0641$$

K_2 TO FIND

$\frac{4}{12} = 0.3333$ $\quad \frac{0.6875 \times 0.75}{144} = 0.003581$ $\quad Q = 1215$

$\frac{9.1}{12} = 1.75$ $\quad F = 1.15$

$\frac{4.5}{12} = 0.375$ $\quad G = 1.44$

$$K_2 = 1.215 \times 1.15 \times 1.44 \times \sqrt{\frac{12}{0.75}} = 8.048$$

$$\frac{0.37 \times 8.048 \times 126.58 \left(460.629 - 177.8\right) 431.8^2}{100\,000} = 198.766.8692$$

ALLOWABLE HP = 0.028231 (351 412 − 198 767)

= <u>4309.32</u> HP metric

= <u>4250.28 U.S. HP</u>

Take Max p from 1500 to 2000

[illegible]	Max p Kgf/cm²	H.P. U.S.
1500	105.4629	5173.775
1600	112.4938	4866.377
1700	119.5[illegible]	4558.[illegible]
1800	126.5556	4251.581
1900	133.5864	3[illegible]44.183
2000	140.6173	3636.795
[illegible]	118.1185	4620.459