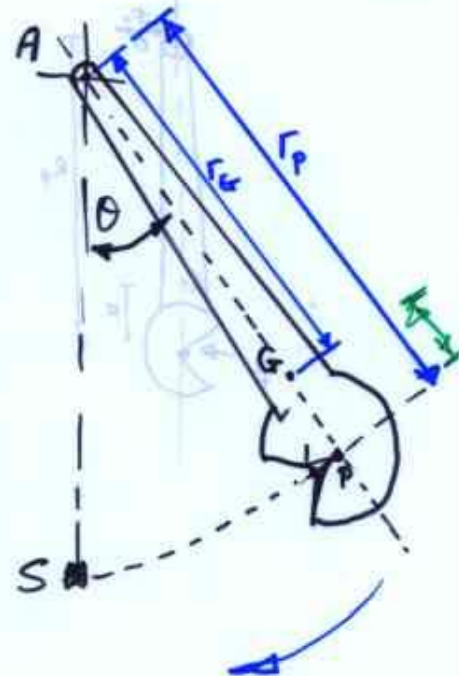


CHARPY Impact TESTER

PENDULUM SWINGS & STRIKES
TARGET AT S.

find r_p to minimise Horiz force
at A during impact

Simplify calc. by assuming Specimen
stops the pendulum.



FREE BODY DIAGRAM
at moment of impact

ang vel just before impact is ω_1 , c.w.

v_{G1} is $r_g \omega_1$, to left \leftarrow

after impact $v_{G2} = 0$ & $\omega_2 = 0$

\Rightarrow angular momentum EoN

$$[\oplus] \quad I_A \omega_1 - (\int F dt) r_p = 0 \quad \cancel{I_A \omega_2 = 0}$$

Linear momentum

$$[\oplus \rightarrow] \quad -m(r_g \omega_1) + (\int F dt) = 0 \quad [\text{note } A_x = 0]$$

SOLVE BETWEEN 2 EQNS, eliminating $\int F dt$:

$$I_A \omega_1 - m r_g \omega_1 r_p = 0$$

$$\Rightarrow r_p = r_g + \frac{k_g^2}{r_g}$$

$$r_p = \frac{r_g^2 + k_g^2}{r_g} = \frac{k_A^2}{r_g} \quad \text{centre of percussion}$$

note $I_A = m k_g^2 + m r_g^2$
radius of gyration
 $I_A = m k_A^2$