$R_A = \frac{qL}{4} + \frac{P}{2}$ $M_{max} = R_A \frac{L}{2} - q\frac{L}{4}\left(\frac{L}{4} + \frac{L}{8}\right) = \frac{L\left(\frac{P}{2} + \frac{Lq}{4}\right)}{2} - \frac{3L^2 q}{32}$

$\sigma_a = 124\ MPa$ $L = 9.75\ m$ $P = 13\ kN$ $q = 6.6\ \frac{kN}{m}$

$S_{reqd} = \frac{M_{max}}{\sigma_a}$ $S_{reqd} = \frac{4\left(\frac{P}{2} + \frac{Lq}{4}\right)\frac{3L^2 q}{32}}{\sigma_a} = 413.662\ cm^3$

$w = 41.9\ \frac{kg}{m} \cdot g = 410.899\ \frac{N}{m}$ $g = 9.807\ \frac{m}{s^2}$

$R_A = \frac{qL}{4} + \frac{P}{2} + \frac{wL}{2}$ $M_{max} = R_A \frac{L}{2} - q\frac{L}{4}\left(\frac{L}{4} + \frac{L}{8}\right) = w\frac{L}{2}\frac{L}{4}$

$= 56.177\ kN \cdot m$

$S_{reqd2} = \frac{M_{max}}{\sigma_a} = 453.038\ cm^3$

$S_{act} = 542\ cm^3$ $w = 47.9\ \frac{kg}{m} \cdot g = 469.739\ \frac{N}{m}$

$R_A = \frac{qL}{4} + \frac{P}{2} + \frac{wL}{2}$ $M_{max} = R_A \frac{L}{2} - q\frac{L}{4}\left(\frac{L}{4} + \frac{L}{8}\right) = w\frac{L}{2}\frac{L}{4}$

$= 56.876\ kN \cdot m$

$S_{reqd2} = \frac{M_{max}}{\sigma_a} = 458.677\ cm^3$ < IPN 280

選 IPN 280