

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

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

$$S_{reqd} = \frac{M_{max}}{\sigma_a} = \frac{9.75 \left( \frac{13}{2} + \frac{9.75 \times 6.6}{4} \right) - \frac{3(9.75)^2 \times 6.6}{32}}{124} = 413.66 \text{ cm}^3$$

$$w = 41.9 \frac{\text{kg}}{\text{m}} \cdot g = 410.899 \frac{\text{N}}{\text{m}} \quad g = 9.807 \frac{\text{m}}{\text{s}^2} \quad \text{註 IPN } > 60 \quad S_{act} = 44 > \text{cm}^3$$

$$R_A = \frac{qL}{4} + \frac{P}{2} + \frac{wL}{2} \quad \text{故 } M_{max} = R_A \frac{L}{2} - q \frac{L}{4} \left( \frac{L}{4} + \frac{L}{8} \right) = w \frac{L}{2} \frac{L}{4} = 56.177 \text{ kN}\cdot\text{m}$$

$$S_{reqd2} = \frac{M_{max}}{\sigma_a} = 453.038 \text{ cm}^3 \quad \text{故 } > 60 \text{ 不適用}$$

$$\text{IPN } > 80 \quad S_{act} = 54 > \text{cm}^3 \quad w = 47.9 \frac{\text{kg}}{\text{m}} \cdot g = 469.739 \frac{\text{N}}{\text{m}}$$

$$R_A = \frac{qL}{4} + \frac{P}{2} + \frac{wL}{2} \quad \text{故 } M_{max} = R_A \frac{L}{2} - q \frac{L}{4} \left( \frac{L}{4} + \frac{L}{8} \right) = w \frac{L}{2} \frac{L}{4} = 56.876 \text{ kN}\cdot\text{m}$$

$$S_{reqd3} = \frac{M_{max}}{\sigma_a} = 458.677 \text{ cm}^3 \quad \text{選用 } > 80$$