

Regneeksempel "North Pamar" - Trim & GM

Flyter på dyppgang $T = 5,20 \text{ m}$

$$KG = 6,88 \text{ m}$$

$$L_{pp} = 82,20 \text{ m}$$

a) Regn ut skibets GM.

$$\text{Arlast KM ved } 5,20 \text{ m} = 9,36 \text{ m}$$

$$GM = KM - KG = 9,36 \text{ m} - 6,88 \text{ m} = 2,48 \text{ m}$$

b) Det lastes $1100 \text{ t} + 600 \text{ t} = 1700 \text{ t}$.

$$\text{Arlast } \Delta_0 \text{ ved } 5,20 \text{ m} = 5770 \text{ t}$$

$$\text{Arlast } LCB_{5,20} = 38,43 \text{ m}$$

$$\text{Even keel} \Rightarrow LCG_0 = LCB_{5,20} = 38,43 \text{ m}$$

$$\frac{1650 \text{ t}}{5770 \text{ t}} = 0,29 \Rightarrow \text{Trim v. store vektor}$$

① Nytt displacement $\Delta_1 = \Delta_0 + \text{Last}$

$$= 5770 \text{ t} + 1700 \text{ t} = 7470 \text{ t}$$

② Ny total $LCG_1 =$

$$LCG_1 = \frac{\Delta_0 \cdot LCG_0 + \text{Decklast} \cdot LCG_{\text{DECK}} + \text{Meland} \cdot LCG_{\text{M&T}}}{\Delta_1}$$

$$= \frac{5770 \text{ t} \cdot 38,43 + 1100 \text{ t} \cdot 28 \text{ m} + 600 \text{ t} \cdot 40 \text{ m}}{7470 \text{ t}}$$

$$= 37,02 \text{ m}$$

③ Ny dyppgang T_1 leses av til 6,35 m

④ Bestemmer hydrostatiske verdier ved T_1 :

$$LCB = 37,61 \text{ m}$$

$$LCF = 34,29 \text{ m}$$

$$MCT1m = 96,6 \text{ tm/cm}$$

⑤ Beregner trimmende moment M_T

$$\begin{aligned} M_T &= \Delta_1 \cdot \bar{BG}_1 = 7470 \text{ t} \cdot (37,61 \text{ m} - 37,02 \text{ m}) \\ &= 4407 \text{ tm} \end{aligned}$$

⑥ Beregner total trim t :

$$t = \frac{M_T}{MCT1m} = \frac{4407 \text{ tm}}{96,6 \text{ tm/cm}} = 46 \text{ cm}$$

⑦ Fordeler trimmen:

$$t_a = LCF \cdot \frac{t}{L_{pp}} = 34,29 \text{ m} \cdot \frac{0,46 \text{ m}}{82,2 \text{ m}} = 0,19 \text{ m}$$

$$t_f = t - t_a = 0,46 \text{ m} - 0,19 \text{ m} = 0,27 \text{ m}$$

⑧ Regner ut dyppangst:

$$T_A = T_1 + t_a = 6,35 \text{ m} + 0,19 \text{ m} = \underline{\underline{6,54 \text{ m}}}$$

$$T_F = T_1 - t_f = 6,35 \text{ m} - 0,27 \text{ m} = \underline{\underline{6,08 \text{ m}}}$$

c) Leset av $KM_{6,35} = 8,97 \text{ m}$

Regner ut ny KG :

$$KG_1 = \frac{\Delta_0 \cdot KG_0 + \text{Dekkslast} \cdot KG_{\text{LAST}} + \text{Metanoll} \cdot KG_{\text{MET}}}{\Delta_1}$$

$$= \frac{5770 \text{ t} \cdot 6,88 \text{ m} + 1700 \text{ t} \cdot 10 \text{ m} + 600 \text{ t} \cdot 3,1 \text{ m}}{7470 \text{ t}}$$

$$= 7,04 \text{ m}$$

$$EFVO = \frac{I \cdot \rho}{\Delta_1} = \frac{1250 \text{ m}^4 \cdot 9,79 \text{ t/m}^3}{7470 \text{ t}} = 0,13 \text{ m}$$

$$GM = KM - KG - EFVO$$

$$= 8,97 \text{ m} - 7,04 \text{ m} - 0,13 \text{ m} = \underline{\underline{1,80 \text{ m}}}$$

d) Her antar vi trim for små vektet.

Videre trenger vi et trimmende moment som utligner trimmen vår.

$$t = \frac{M_T}{MCT_{1\text{cm}}} \Rightarrow 0,46 \text{ cm} = \frac{M_T}{96,6 \text{ tm/cm}}$$

⇓

$$M_T = 4444 \text{ tm}$$

Avstanden fra LCF til tanken forut er
 $80,40 \text{ m} - 34,29 \text{ m} = 46,11 \text{ m}$

$$M_T = W \cdot h, \text{ der } h = 46,11 \text{ m}$$

\Downarrow

$$W = \frac{M_T}{h} = \frac{4444 \text{ t m}}{46,11 \text{ m}} = \underline{\underline{96,4 \text{ t}}}$$

Det må fylles 96,4 t for å nå even keel.

$$\left(\frac{96,4 \text{ t}}{7470 \text{ t}} = 0,01 \Rightarrow \text{Trim med små vekter} \right)$$