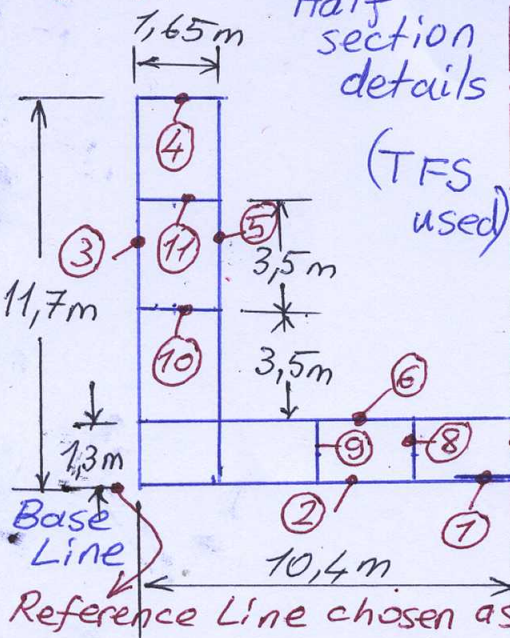


- AN EXAMPLE FOR (SM) "SECTION MODULUS" CALCULATION -



member #	Members	Dimensions (b x h)
①	Flat keel	0,75 x 0,0165
②	Bottom plating	9,65 x 0,0145
③	Side Shell //	0,0145 x 11,7
④	Deck plating	1,65 x 0,0145
⑤	Inner side shell	0,0145 x 11,7
⑥	Inner bottom plating	10,4 x 0,011
⑦	Centre girder (half)	0,007 x 1,3
⑧	side girder (1)	0,011 x 1,3
⑨	side girder (2)	0,011 x 1,3
⑩	side stringer (1)	1,65 x 0,012
⑪	side " (2)	1,65 x 0,012

Member #	$A_i [m^2]$	$y_i [m]$	$A_i \times y_i [m^3]$	$I_i [m^4]$	$d_i [m]$	$d_i^2 [m^2]$	$A_i \times d_i^2 [m^4]$
①	0,01237	0,0082	0,0001	≈ 0	3,814 - 0,0082	$(3,8058)^2$	0,1796
②	0,1399	0,0072	0,0010	≈ 0	3,814 - 0,0072	$(3,8068)^2$	2,0274
③	0,16965	5,85	0,9924	1,9353	3,814 - 5,85	$(-2,036)^2$	0,7030
④	0,0239	11,69	0,2797	≈ 0	3,814 - 11,69	$(-7,876)^2$	1,4825
⑤	0,16965	5,85	0,9924	1,9353	3,814 - 5,85	$(-2,036)^2$	0,7030
⑥	0,1144	1,29	0,1476	≈ 0	3,814 - 1,29	$(2,524)^2$	0,7288
⑦	0,0091	0,65	0,0059	0,0013	3,814 - 0,65	$(3,164)^2$	0,0911
⑧	0,0143	0,65	0,0093	0,0020	3,814 - 0,65	$(3,164)^2$	0,1431
⑨	0,0143	0,65	0,0093	0,0020	3,814 - 0,65	$(3,164)^2$	0,1431
⑩	0,0198	4,8	0,0950	≈ 0	3,814 - 4,8	$(-0,986)^2$	0,0192
⑪	0,0198	8,3	0,1643	≈ 0	3,814 - 8,3	$(-4,486)^2$	0,3984
$\Sigma_1 = 0,7072$		$\Sigma_2 = 2,697$	$\Sigma_3 = 3,8759$				$\Sigma_4 = 6,6192$

$$y_{NA} \approx \frac{\sum A_i \times y_i}{\sum A_i} = \frac{\Sigma_2}{\Sigma_1} = 3,814 [m]$$

$$y_{max} = ? \quad y_{NA} = y_{Bottom}$$

$$y_{Deck} = D - y_{NA}$$

$$y_{Deck} = 11,7 - 3,814 = 7,886 [m]$$

Because $y_{Deck} > y_{Bottom}$

$$y_{max} = y_{Deck} = 7,886 [m]$$

$$\text{Section modulus: } SM = \frac{I_{NA}}{y_{max}}$$

$$SM = 2,66 [m^3]$$

$$I_{NA} \approx \sum I_i + \sum A_i \times d_i^2$$

Remember that half section used!

$$I_{NA} = 2 \times (\Sigma_3 + \Sigma_4) = 20,99 [m^4]$$

According to GL Rules

$$W_{min} = k \cdot C_0 \cdot L^2 \cdot B \cdot (C_B + 0,7) C_{RS} \cdot 10^{-6}$$

$$W_{min} = 10 \cdot 8,73 \cdot 140^2 \cdot 20,8 (0,7 + 0,7) \cdot 1,0 \cdot 10^{-6}$$

$$W_{min} = 4,98 [m^3]$$

Since $(SM) < W_{min}$

Midship Section not qualified!