Innovative Ship Design

- Midterm Exam -

April 7th, 2012

Part I. Determination of Main Dimensions, 13:00-13:50 (50 minutes)

Part II. Propeller and Main Engine Selection, 13:50-14:40 (50 minutes)

Part III. Freeboard Calculation, 14:40-15:30 (50 minutes)

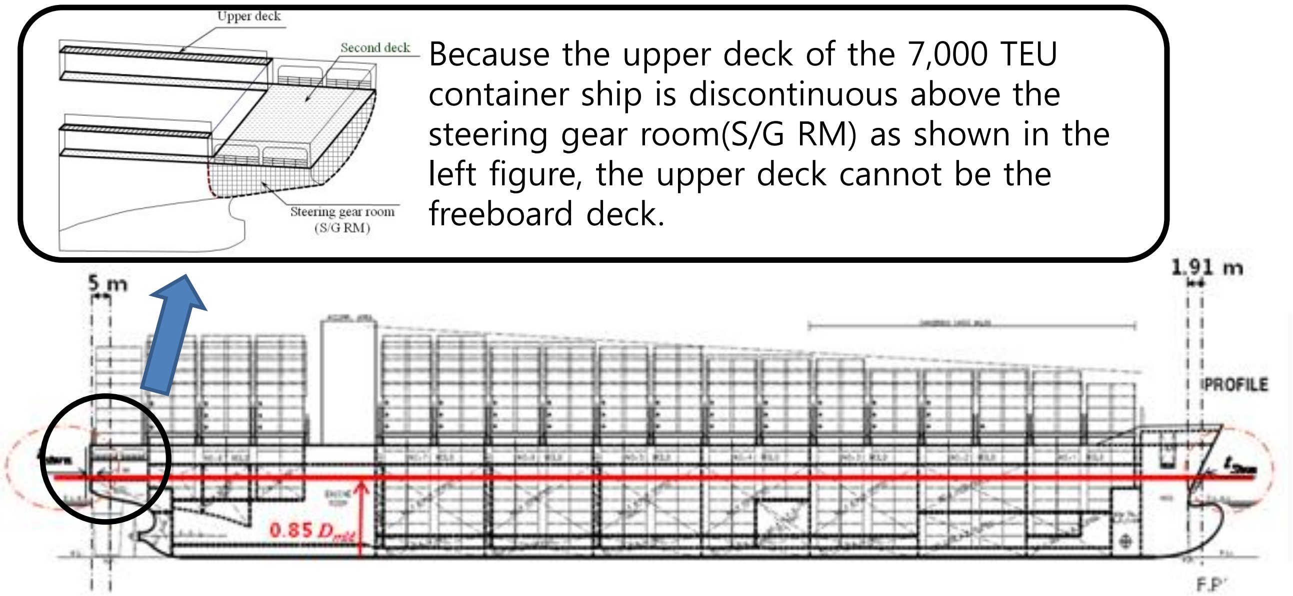
Part IV. Mixed Problems, 15:30-16:00 (30 minutes)

Name	
SNU ID #	

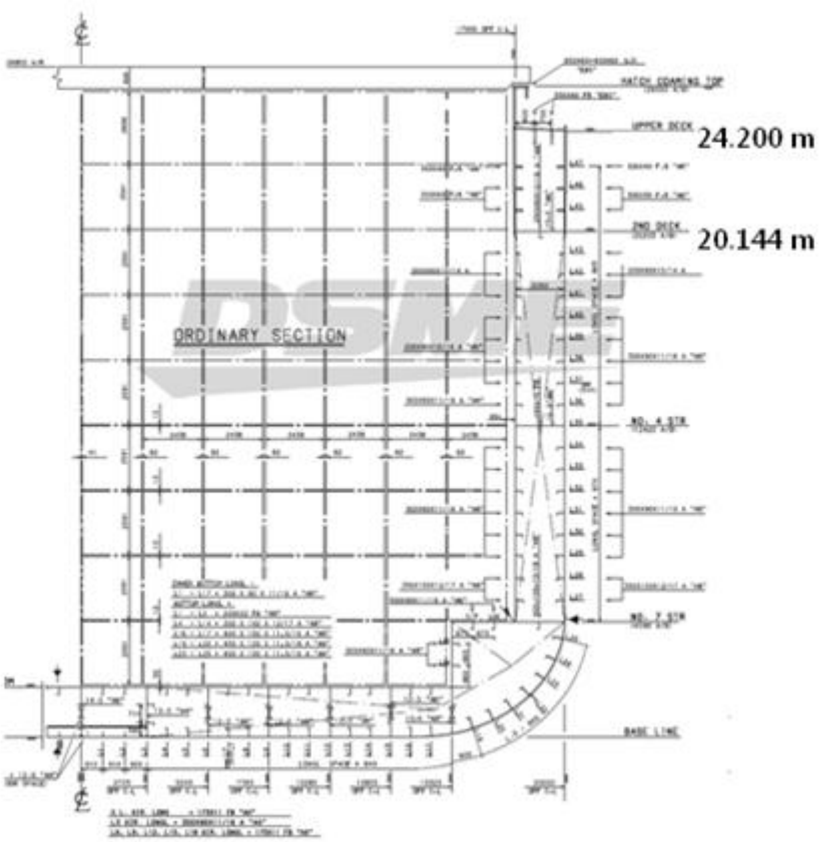
Note: Budget your time wisely. Some parts of this exam could take you much longer than others. Move on if you are stuck and return to the problem later.

Problem Number		[Part 1]			[Part 2]							Total
		1	2	3	1	2	3	4	5	6	7	
Grader	Max	10	5	5	10	10	10	10	15	15	10	100
	Score											

1. Mark the freeboard deck of the ship in the Figure 1 and Figure 2, and explain the meaning of the freeboard.



[Figure 1: General Arrangement of 7,000TEU Container ship]



[Figure 2: Midship Section of 7,000TEU Container ship]

2. Calculate the freeboard length(L_f)

t_stem: 0.015 m
t_stern: 0.015 m

3. 'ICLL 1966' is an abbreviation. Write down the description of the abbreviation.

[Part 2] Freeboard Calculation

1. Calculate the tabular freeboard(F_t)

2. Correction for block coefficient($C_{B,0.85Dmld}$)

(1) Calculate block coefficient at 0.85 Dmld

(Volume of the molded displacement at 0.85Dmld is 148,244.0 m^3)

(2) Calculate the correction for block coefficient

(If there is no correction for block coefficient, the correction for block coefficient shall be taken as zero.)

3. Correction for depth (D_f)

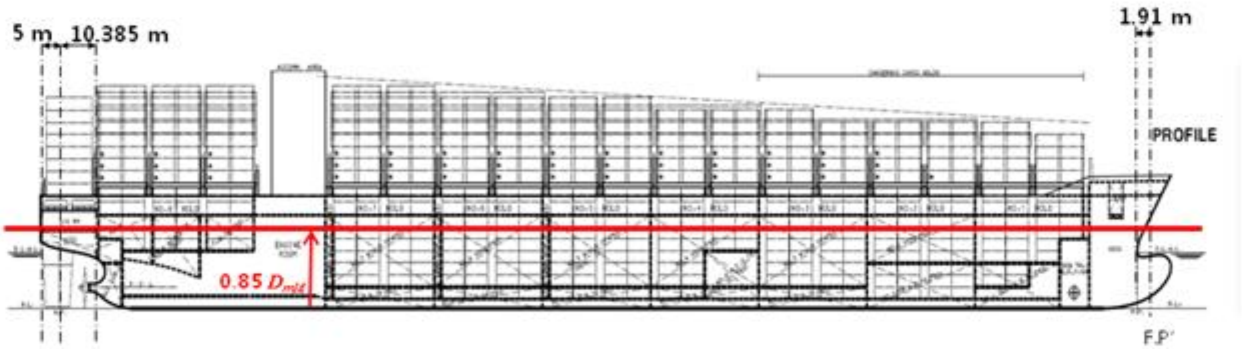
(1) Calculate the depth for freeboard (D_f) by using D_{mld}, $t_{stringer}$

- D_{mld}: Molded depth. The vertical distance measured from the top of the keel to the top of the freeboard deck beam at side. - $t_{stringer}$: Thickness of the stringer plate (= 0.022m)

(2) Calculate the correction for depth

(If there is no correction for depth, the correction for depth is zero.)

4. Deduction for superstructure and trunks



[Figure 3: General Arrangement of 7,000TEU Container ship]

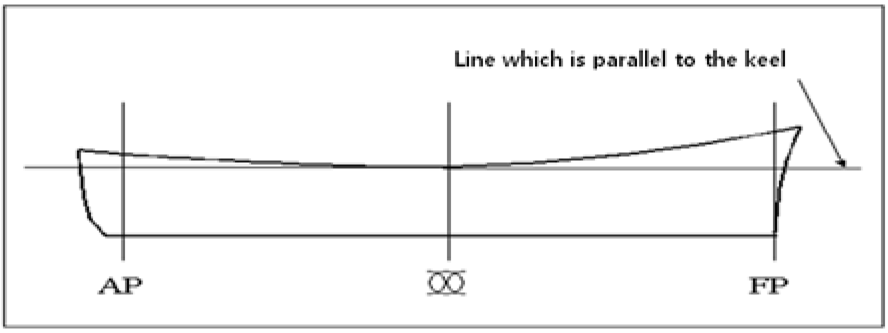
(1) What is the superstructure of the ship in Figure? Mark it in Figure 3.

(2) Calculate the effective length of superstructure (L_E)

(3) Calculate the deduction for superstructure

If the effective length(L_E) of superstructures and trunk is less than 1.0 L_f , the deduction shall be a percentage obtained from ICLL rule.

5. Correction for sheer



[Figure 4]

(1) What is the sheer of the ship in Figure 4? Mark it in Figure 4.

(2) Calculate the correction for sheer and sheer credit for superstructure.

$$\text{Correction for shear} = (S_o - S)\cdot(0.75 - 0.5r_1)$$

S_o : Standard height of Sheer (mm)

S : Mean height of actual Sheer(mm)

r_1 : The total length of superstructure excluding trunks(Ls) divided by freeboard length(L_f)

$$r_1 = L_s / L_f$$

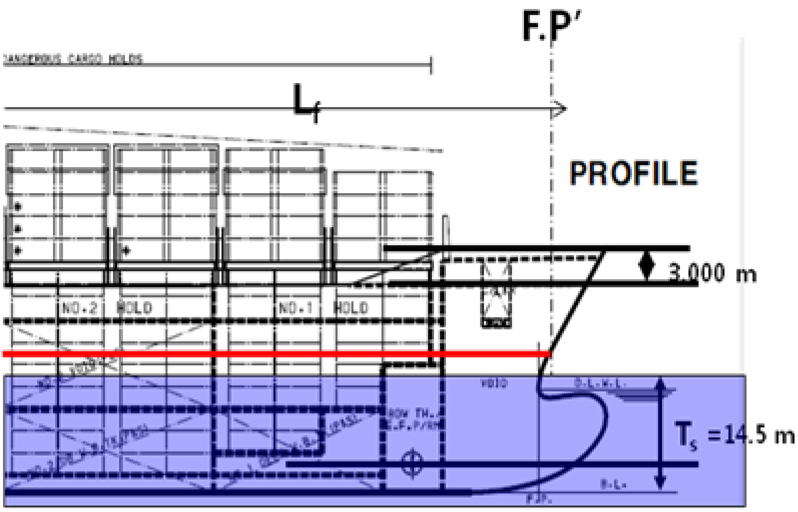
Station		Standard*				Actual			
		Height(mm)	Ordinate	Factor	Product	Height(mm)	Ordinate	Factor	Product
After hand	A.P	25.0(L_f/3+10)		1		S1	0	1	0
	L_f/6(from A.P)	11.1(L_f/3+10)		3		S2	0	3	0
	L_f/3(from A.P)	2.8(L_f/3+10)		3		S3	0	3	0
	Amidiship	0		1		S4	0	1	0
	Mean height	S_A = 8.34(L_f/3 + 10)				S_a			0
Forward hand	Amidiship	0		1		S4	0	1	0
	L_f/3(from F.P)	5.6(L_f/3+10)		3		S5	0	3	0
	L_f/6(from F.P)	22.2(L_f/3+10)		3		S6	0	3	0
	F.P	50.0(L_f/3+10)		1		S7	0	1	0
	Mean height	S_F = 16.64(Lf/3 +10)				S_f			0

6. Minimum bow height

(1) Calculate the minimum bow height

(2) Calculate the actual bow height

Thickness of the stringer plate = 0.022 m



[Figure 5]

(3) Calculate the correction for the minimum bow height (If there is no correction for the minimum bow height, the correction for the minimum bow height is zero.), and mark the bow height in Figure 5.

7. Maximum molded summer draft

(1) Calculate summer freeboard

(2) Calculate maximum molded summer draft(d_s)

(3) Dose the calculation results satisfy ICLL rule?