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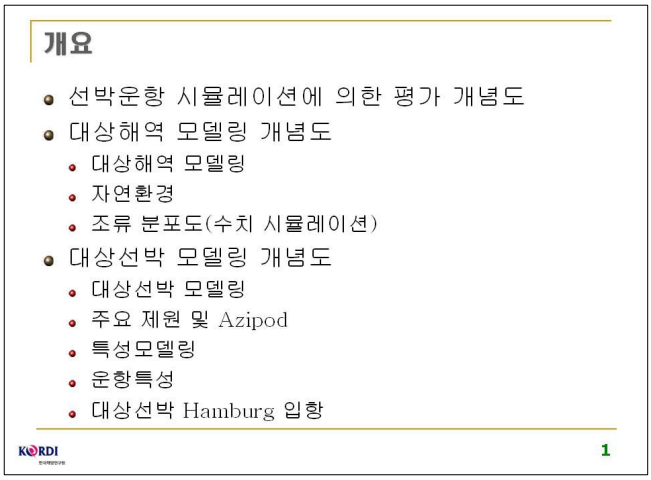
제주강정항 항만 모델링 및 15만톤급 크루즈 선박의 조종성능 모델링

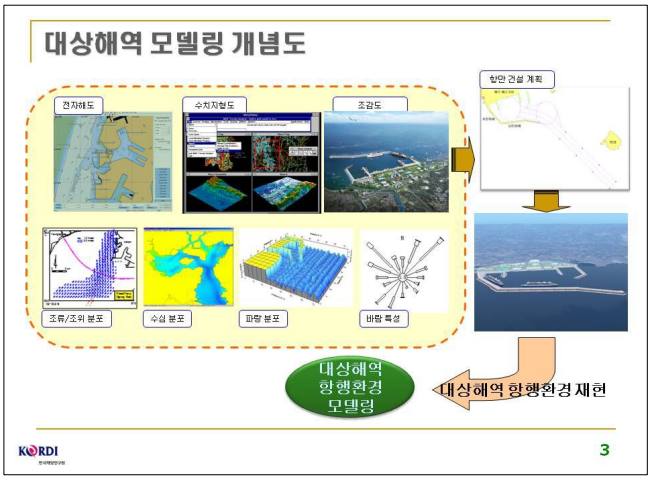
† 공 인영 · 이윤석* · 양 영훈** · 윤 근항*** · 정 미현**

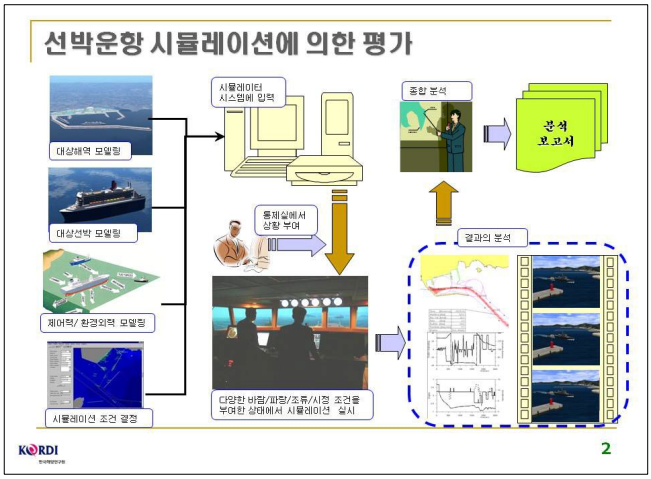
† 한국해양연구원 책임연구원, *한국해양대학교 교수, **한국해양연구원 연구원, ***한국해양연구원 선임연구원

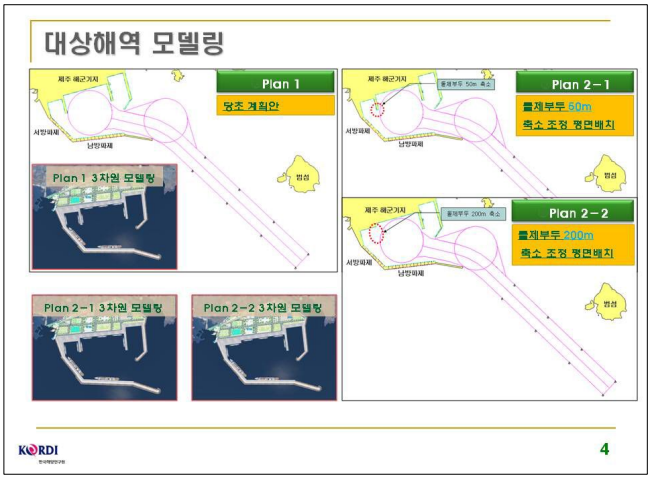
요 약 : 제주 민군복합항에 입항 예정인 최대급 선박인 15만 GT급 크루즈 여객선(Queen Mary II)이 한계상황에서 무사하게 입출항 및 접이안할 수 있는가를 평가하기 위한 시뮬레이션을 실시함에 있어서, 대상해역 및 대상 선박의 정확한 모델링은 평가에 필수적인 요소이다. 본 논문에서는 이러한 평가를 수행하기 위한 대상 항만 및 대상 선박 모델링 결과에 대해 간략하게 기술한다.

핵심용어 : 민군복합항, Queen Mary II, 대상항만 모델링, 대상해역 모델링





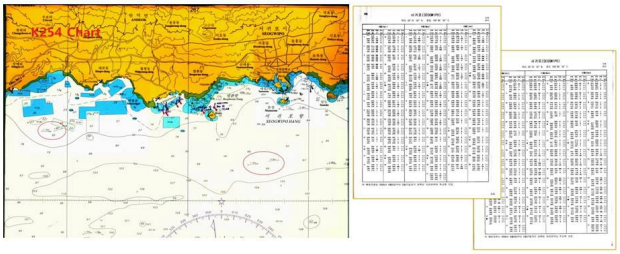




† 교신저자 종신회원) iygong@moeri.re.kr

자연환경

- 해상교통안전진단 선박조종 시뮬레이션 바람 조건 14m/s 입력
  - 풍향은 선박조종에 불리한 방향(NE, SW)
- 공식적인 조류 자료(해도 및 조석표) 및 항만 개발 후 조류 변화(수치시뮬레이션) 검토



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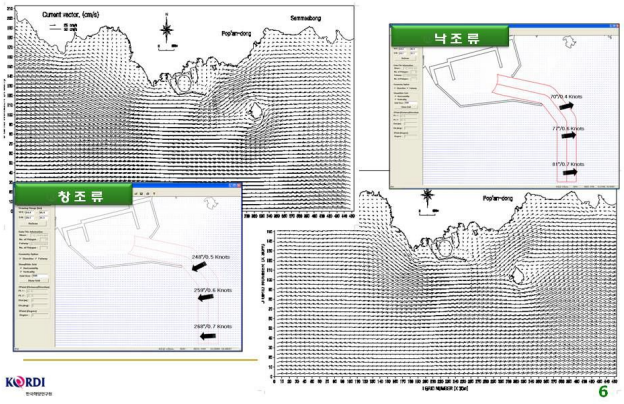
조류분포도(수치 시뮬레이션)



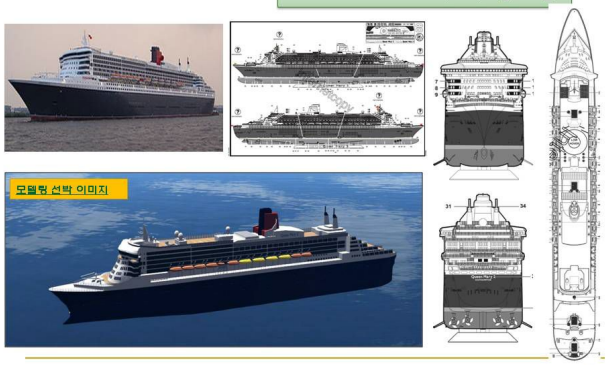
KORDI 6

대상선박 모델링 개념도

KORDI 7

대상선박 모델링

선박갯이 / 선박 폭 / 흘수 / 높이 / G T / 승객 / 연도
345m / 41m / 10.1m / 72m / GT 151,400 / 3,056명 / 2004년



KORDI 8

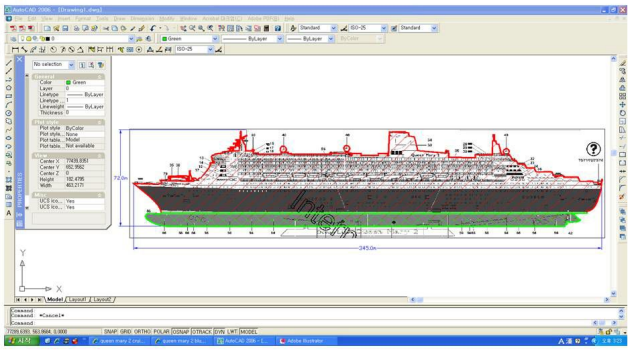
주요 제원 및 Azipod

대상 선박	전장	Lpp	폭	흘수	풍압면적
Queen Mary 2	345m	301m	41m	10m	정면적 : 13,915m², 측면적 : 2,234m²
선수 Thruster 용량	3x3200kW = 9,600,000 N · m/sec = 13,056 HP				
선미 Thruster 용량	2x21,500kW = 43,000,000 N · m/sec = 58,480 HP (선미 2 Fixed Pod & Azimuthing Pod)				

Two of these are azimuthing pods (frequently referred to as "azipods"), which can rotate 360 degrees. The other two pods are fixed in position. Each of the pods contains an electric motor. Attached to the shaft of the electric motor at the front of each pod is a fixed blade propeller with a diameter of six meters.

KORDI 9

대상 선박 모델링(풍압면적)



KORDI 10

15만 GT급 크루즈선 특성 모델링

http://www.beyondships.com/QM2-Bridge.html
http://www.beyondships.com/QM2-art-Watling.htm

Photo. The navigational controls are duplicated on each bridge wing. The computer screens above the console can display charts, radar, closed-circuit television and the ship's "Harbor Approach" display.

Located next to the pod controls is a joy stick.

By pushing this stick in different directions, an officer can maneuver the ship ahead, astern or laterally. This is made possible by the ship's Dynamic Positioning System which combines information from the ship's global positioning system and information derived from sensors as wind and heading to determine what combination of bow thrusters and pods will be need to maintain a specified position.

KORDI

11

대상 선박 Hamburg 입항

15만 GT급 크루즈선 특성 모델링

http://www.youtube.com/watch?v=RiquyQTKJyQ&feature=player_detailpage

http://www.worldshipny.com/qm2blog.shtml

I had two minutes to get from 2 Deck to 12 Deck forward to meet the group visiting the bridge. The Commodore hosted the first part of the bridge tour. There were a few new things that I learned. **Queen Mary 2 can maneuvre without the aid of tugs with a beam wind up to 27 knots**, then above that she has to have assistance or to cancel the port call. Full engine power without the gas turbines will yield just over 23 knots, and one gas turbine will add another three, and two again another three. But the price to fuel the gas turbines is twice as expensive, so he tries not to have to use them.

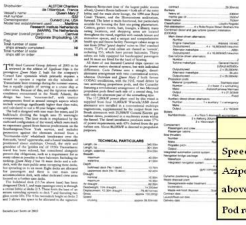
KORDI

12

운항특성 모델링

Significant Ship 2003, p93

QUEEN MARY 2: the largest passenger ship ever built



Manuevering Characteristics				
Order	Setting		Speed(Kts)	
	Lever	RPM	2 Pods	4 Pods
Full Ahead	8	105	13.0	21.5
Half Ahead	6	70	9.0	14.5
Slow Ahead	4	50	6.0	10.1
Dead Slow Ahead	2	30	4.0	6.2
Stop	0	0	0.0	0.0
Dead Slow Astern	2	30	4.0	6.0
Slow Astern	4	50	6.0	10.1
Half Astern	6	70	9.0	14.0
Full Astern	8	105	13.0	21.0

CRASH STOP	
Service Speed - 26kts	Service Speed - 13 kts
7m 45s - 1.69NM	7m 45s - 0.84NM

Limitations		
Speed must be set at less than 10 kts before Azipods will operate in 360° mode.		
Azipod will only operate to 35° when speed set above 10 kts.	Hard Over to Hard Over	29 sec
Pod revolutions to be not less than 20 RPM	Speed at minimum RPM	4 Kts

KORDI

13