4만6천톤급 석유/화학 운반선의 추진축계 배치를 위한 선체 변형 해석

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An Analysis of Hull Deflection for Propulsion Shaft Alignment of a 46,000 DWT Oil/Chemical Carrier

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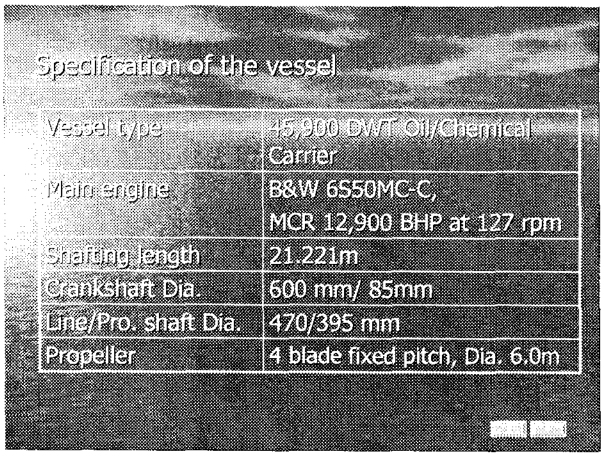
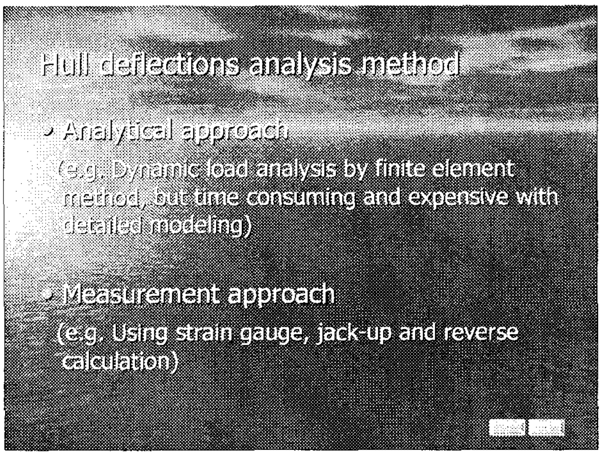
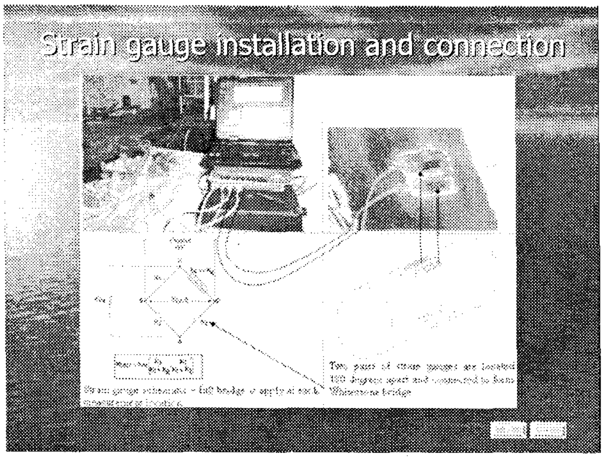
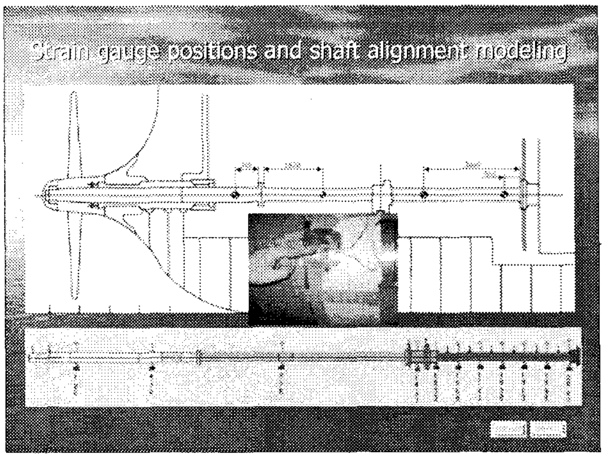
Abstract : 선체 변형에 의해 발생할 수 있는 베어링 손상을 최소화하기 위해서는 설계 단계에서 선체 변형을 고려한 축계 배치 해석이 이루어져야 한다. 선체 변형은 유한 요소법을 이용한 구조해석에 의한 방법과 측정 데이터를 이용한 역분석 방법으로 구할 수 있다. 이 연구에서는 측정에 의해 얻어진 베어링 반력과 축의 굽힘 모멘트를 이용하여 선체 변형을 구하는 방법에 대해 설명하고, 이를 4만6천톤급 석유/화학 운반선에 적용하여 다른 운전 조건에 대한 베어링 옵셋 변화와 선체 변형량을 검토한다.









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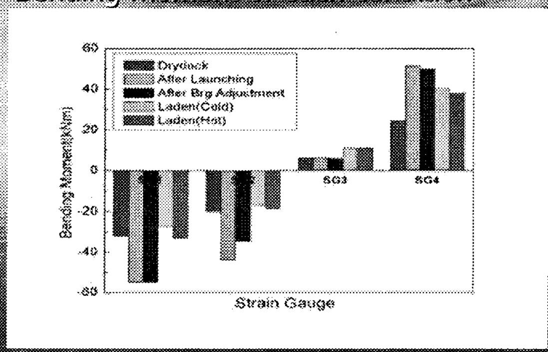
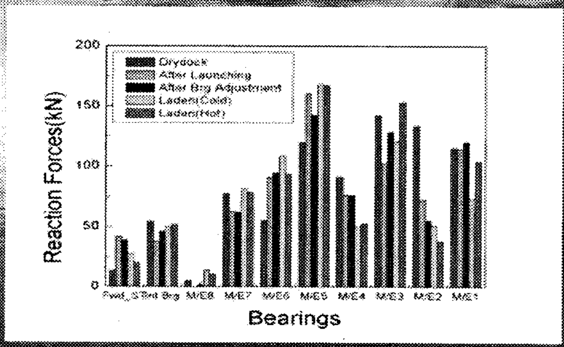
Measurement conditions

- Dry dock - cold condition
- After launching before final adjustment; cold condition (Draft; aft:3.6m, fore: 3.6m)
- After launching after final adjustment; cold condition (Draft; aft: 3.5m, fore: 4.2m)
- Sea trial; design laden-cold condition (Draft; aft 11m, fore 11m)
- Sea trial; design laden-hot condition (Draft; aft 11m, fore 11m)

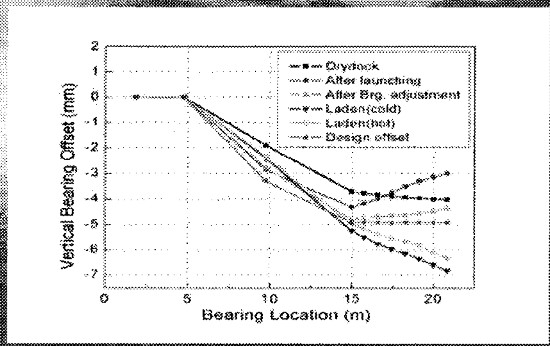
Bending moment of each condition



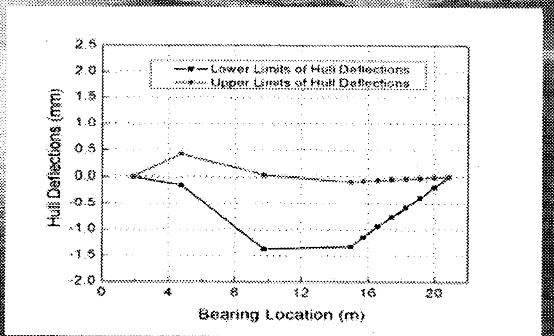
Bearing reaction forces of each condition



Bearing offset of each condition



Lower and upper limits of hull deflections



Conclusions

- Hull deflection analysis using the bending moments and bearing reactions has been carried out for a 46,000 DWT oil/chemical carrier.
- No. 1(foremost) main engine bearing offset was higher and No. 8(aftmost) main engine bearing offset was lower when the condition is changed from drydock to launching.
- No. 1 (foremost) main engine bearing offset was lower when the condition is changed from light ballast to laden.
- Hull deflections caused by different vessel conditions are not large in a 46,000 DWT oil/chemical carrier.
- Where the hull deflection data obtained by this research will be used for the shaft alignment analysis of similar or identical vessels, time and expense will be reduced and the bearing damage will be prevented