TUGAS AKHIR - LS 1336

DESAIN SISTEM CONTROL PADA SISTEM BALLAST YANG DIOPERASIKAN SECARA OTOMATIS UNTUK MENJAGA STABILITAS KAPAL PADA MV. SINAR JAMBI

ADI PRIYATMONO
NRP 4202 100 050

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Surabaya, 2007

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FINAL PROJECT - LS 1336

DESIGN OF CONTROL SYSTEM ON REMOTELY OPERATED BALLAST SYSTEM TO MAINTAIN SHIP STABILITY OF MV. SINAR JAMBI

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Surabaya, 2007

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LEMBAR PENGESAHAN

DESIGN OF CONTROL SYSTEM ON REMOTELY OPERATED BALLAST SYSTEM TO MAINTAIN SHIP STABILITY OF MV. SINAR JAMBI

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Diajukan Guna Memenuhi Sebagian Persyaratan
Untuk Memperoleh Gelar Sarjana Teknik
pada
Jurusan Teknik Sistem Perkapalan
Fakultas Teknologi Kelautan
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Surabaya
Januari, 2007

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ABSTRACT

Safety issue on ship is the main reason this research held. One of parameters as indicated the ship on the safe condition is stabilities. The important component to keep the stabilities is ballast system. Ballast system work to keep draft of the ship on the good condition. It means that the draft feasible to maintain ship moving on pitching and rolling with the appropriate period of time. The others parameters are ship on the even keel condition.

Looking for their vital function, ABS published new regulation about ballast system. These regulation rules that the valve of ballast system must be installed on the each suction ballast tank. Its to restrain flooding on the ballast tank if leak had been occurred on the ballast pipe. To provide ship operator with the most effective system possible, Its need the new design for control ballast mechanism. Automatically control system is appropriate solution for this and all at once to get the ballast volume that suitable with the change weight of the ship MV Sinar Jambi.

Key Word : Stability, Ballast system and Control mechanism.

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ABSTRAK

Isu keamanan kapal merupakan alasan utama penelitian ini dilakasanakan. Salah satu parameter yang mengindikasikan kapal dalam kondisi aman adalah stabilitas. Komponen utama untuk menjaga stabilitas kapal adalah sistem ballast kapal. Sistem ballast bekerja untuk menjaga draft kapal dalam kondisi aman. Hal ini berarti draft mampu untuk menjaga pergerakan kapal pada saat picthing dan rolling dengan periode waktu yang tepat.Parameter lainnya adalah kapal berda dalam kondisi even keel.

Melihat fungsinya yang begitu vital, ABS mengeluarkan aturan baru yang mengatur tentang sistem ballast.Dalam aturan tersebut disebutkan bahwa valve pipa ballast harus berada dalam tanki hisapnya. Hal ini dimaksudkan untuk mencegah terjadinya flooding pada tangki ballast apabila terjadi kebocoran pada pipa ballast yang bisa mengganggu stabilitas kapal. Untuk mempermudah operator mengoperasikan valve tersebut maka perlu mekanisme sistem operasi ballast yang baru. Sistem Control Otomatis merupakan solusi yang tepat untuk mengatasi permasalahn tersebut sekaligus sistem ini mampu menyediakan volume ballast sesuai dengan perubahan berat kapal. Sistem ini bisa diterapkan pada kapal terutama yang mengadopsi aturan ABS termasuk salah satunya MV.SinarJambi

Kata Kunci :Stabilitas, Sistem ballast dan Mekanisme control

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PREFACE

First, Thanks to our god who has been giving us all out of mercy and blessing in order to finish our final project without any main mistake and obstacles, in order the final project can finish in the right time.

The final project has a title " **DESIGN OF CONTROL SYSTEMON REMOTELY OPERATED BALLAST SYSTEM TO MAINTAIN SHIP STABILITY OF MV. SINAR JAMBI ".** The final project will design new operated ballast system with remotely operated to change existing ballast system on MV Sinar Jambi which is manually operated. New operated ballast design will be done automatically and feasible to get ballast volume suitable with the change of trim or heel moment . It has some advantages such as easy operation, simple design, cheap etc. It makes consequences to invest some equipment such as ballast valve, pneumatic actuator, pipe capillary etc.

I would like to say thanks to all of party, friends, Marineers02, lecturers, and graduation of marine engineering department who have helped us as morale or material in order to finish my final project. Especially thanks to member of such as:

1. My Parent (always supports me in good or in bad condition.
2. Mr. Hari Prastowo, M.Sc. as my supervisor.
3. Mr. Indra Ranu Kusuma as my supervisor
4. Mr. Surjo widodo Adjie as a chief of Marine Engineering
5. All of lecturer in marine engineering department especially Mr. Alam Baheramsyah, Surjo Widodo adjie etc.
6. Mr. Yunianto as member of Festo Company
7. Especially my friend in same supervisor: Miftakhul Arief and Johannes Gospel

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9. Deby, Gogon, Uthux, Dani, The world is not enough
10. Member of Marineers02.
11. Especially for Catalina thanks for your love.
12. Nduk Nika the world will be silent without you

I hope all of member in above can get some rewards from our god.

The last, I know in this final project consist of some mistake and lacks, so I hope some advise and new revision for more complete of final project.

Surabaya, 9th February 2007

Adi Priyatmono

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SYMBOLS

LPP : Length between perpendiculars (m)
B : Breath of ship which is measure on midship section (m)
T : Depth of hull which is measure from keel until water line (m)
KG : Vertical distance from keel to centre of gravity (m)
GM : Vertical distance from centre of gravity to point of metacentre (m)
BM : Vertical distance from centre of buoyancy to metacentre (m)
BML : Distance from centre of buoyancy to longitudinal metacentre (m)
TPC : The mass which must be loaded or discharged to change mean ship draft in salt water by one centimeter (Ton/cm)
LCF : Longitudinal centre of floatation (m)
MCT : Moment which must be given to change mean draft in salt water by one centimeter (ton-m/cm)
D : Height of ship which is measure from the keel Until main deck without shell thickness (m)
d : Pipe diameters (m)
Q : Pump capacity (m^3 / s)
V : Velocity of liquids (m/s)
Pbar : Pressure at Pump (bar)
Pes : Minimum pressure on the free liquid level (bar)
Pvap : Pressure vapor of the liquid at the maximum opera ting temperature (bar)
Hs : Height of liquid free surface (m)
Hfs : Friction head losses in suction piping (m).

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