# MARTEC 2014 OVERVIEW PROGRAM

Day One
Friday-October 24, 2014

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|---|---|---|---|---|---|
| 10.00 | Opening of MARTEC 2014 Exhibition | | | | |
| 11.00 | Registration | | | | |
| 12.00 | Lunch | | | | |
| 13.45 | Opening & Welcome Remarks MC | | | | |
| 13.50 | Report from Organizing Committee<br>Prof. Dr. Eko Budi Djatmiko, DEA<br>Chairman of MARTEC 2014 | | | | |
| 14.00 | Opening Speech<br>Prof. Dr. Tri Yogi Yuwono, DEA<br>Rector of Institut Teknologi Sepuluh Nopember | | | | |
| 14.10 | Photo Session | | | | |
| 14.20 | Keynote Speech<br>Prof. Dr. Sjarief Widjaja<br>Secretary General, Ministry of Marine Affairs and Fisheries<br>Republic of Indonesia | | | | |
| 14.50 | Coffe Break | | | | |
| 15.10 | Invited Speech<br>Prof. Dr. Rer. Nat. Norbert Gruenwald<br>Director of Robert Schmidt Institute, Wismar University, Germany | | | | |
| 15.35 | Discussion | | | | |
| 15.45 | Invited | | | | |
| 16.10 | Discussion | | | | |
| 16.20 | Invited Speech<br>Mr. Ato Suyanto<br>Subsea Technical Expert, PT. Pertamina Hulu Energi, Indonesia | | | | |
| 16.55 | Discussion | | | | |
| 17.05 | Invited Speech<br>Mr. Sawarendro<br>Deputy Representative, Witteveen+Bos, Indonesia | | | | |
| 17.30 | Discussion | | | | |
| 17.40 | Dinner | | | | |
| 19.00 | Parallel Session | | | | |
| | **Room A** | **Room B** | **Room C** | **Room D** | **Room E** |
| | ***Session 1*** | ***Session 1*** | ***Session 1*** | ***Session 1*** | ***Session 1*** |
| 19.00 | Paper MT-01 | Paper ME-01 | Paper MS-01 | Paper MM-01 | Paper MT-18 |
| 19.20 | Paper MT-02 | Paper ME-02 | Paper MS-02 | Paper MM-02 | Paper MT-19 |
| 19.40 | Paper MT-03 | Paper ME-03 | Paper MS-03 | Paper MM-03 | Paper MT-20 |
| 20.00 | Paper MT-04 | Paper ME-04 | Paper MS-04 | Paper MM-04 | Paper MT-21 |
| | ***Session 2*** | ***Session 2*** | ***Session 2*** | ***Session 2*** | ***Session 2*** |
| 20.20 | Paper MT-05 | Paper ME-05 | Paper MT-35 | Paper MM-05 | Paper MT-22 |
| 20.40 | Paper MT-06 | Paper ME-06 | Paper MT-36 | Paper MM-06 | Paper MT-23 |
| 21.00 | Paper MT-07 | Paper ME-07 | Paper MT-37 | Paper MM-07 | Paper MT-24 |
| 21.20 | Paper MT-08 | Paper ME-08 | Paper MT-38 | Paper MM-08 | Paper MT-25 |
| 21.40 | Finish Day One | | | | |
| 22.00 | Return to Hotel | | | | |

Day Two : Saturday – October 25, 2014

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|---|---|---|---|---|---|
| 08.30 | Registration | | | | |
| 09.00 | Invited Speech<br>Mr. Rudiyanto<br>President Director, PT. Biro Klasifikasi Indonesia | | | | |
| 09.25 | Discussion | | | | |
| 09.35 | Invited Speaker<br>Mr. Agoes Sapto<br>LNG Expert, SKK Migas, Indonesia | | | | |
| 10.00 | Discussion | | | | |
| 10.10 | Invited Speaker<br>Dr. Xiaobo Chen<br>Head of Deepwater Technology Research Centre, BV, Singapore | | | | |
| 10.35 | Discussion | | | | |
| 10.45 | Signing of MoU on the collaboration between ITS and BV | | | | |
| 10.50 | Coffe Break | | | | |
| 11.10 | Parallel Session | | | | |
| | **Room A** | **Room B** | **Room C** | **Room D** | **Room E** |
| | ***Session 3*** | ***Session 3*** | ***Session 3*** | ***Session 3*** | ***Session 3*** |
| 11.10 | Paper MT-09 | Paper ME-09 | Paper MS-05 | Paper MM-09 | Paper MT-26 |
| 11.30 | Paper MT-10 | Paper ME-10 | Paper MS-06 | Paper MM-10 | Paper MT-27 |
| 11.50 | Paper MT-11 | Paper ME-11 | Paper MS-07 | Paper MM-11 | Paper MT-28 |
| 12.10 | Lunch | | | | |
| | ***Session 4*** | ***Session 4*** | ***Session 4*** | ***Session 4*** | ***Session 4*** |
| 13.00 | Paper MT-12 | Paper ME-12 | Paper MS-08 | Paper MM-12 | Paper MT-29 |
| 13.20 | Paper MT-13 | Paper ME-13 | Paper MS-09 | Paper MM-13 | Paper MT-30 |
| 13.40 | Paper MT-14 | Paper ME-14 | Paper MS-10 | Paper MT-41 | Paper MT-31 |
| | ***Session 5*** | ***Session 5*** | ***Session 5*** | ***Session 5*** | ***Session 5*** |
| 14.00 | Paper MT-15 | Paper ME-15 | Paper MT-39 | Paper MT-42 | Paper MT-32 |
| 14.20 | Paper MT-16 | Paper ME-16 | Paper MT-40 | Paper MT-43 | Paper MT-33 |
| 14.40 | Paper MT-17 | Paper ME-17 | Paper MT-45 | Paper MT-44 | Paper MT-34 |
| 15.00 | Preparation for Cruise | | | | |
| 15.30 | Transport to Tanjung Perak Seaport | | | | |
| 16.00 | Arrive at Tanjung Perak Seaport and Boarding the Ship | | | | |
| 16.30 | Cruising Start | | | | |
| 18.00 | Business Presentation<br>Mr. Bambang Harjo<br>President Director, PT Dharma Lautan Utama<br>Member of Parliament, Republic Indonesia | | | | |
| 18.30 | Closing Remarks<br>Prof. Dr. Eko Budi Djatmiko<br>Chairman of MARTEC 2014 | | | | |
| 18.35 | Gala Dinner | | | | |
| 20.30 | Ship Harboring & Finish Day Two | | | | |
| 21.00 | Return to Hotel | | | | |

Day Three : Sunday-October 26, 2014

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| 08.30 | Surabaya City Tour Start |
| 10.00 | Coffe Break |
| 10.15 | Surabaya City Tour Continue |
| 12.00 | Lunch |
| 13.00 | Closing &  Return to Hotel |

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|---|---|---|---|
| 20.20 | Combustion of Biofuelin Marine Diesel Engine and Its Improvement by Hybrid Injection System | Sumito NISHIO, Takeyuki KISHI and Tetsugo FUKUDA | ME-05 |
| 20.40 | The Use of Flow Meter for Monitoring Fuel Oil Consumption in a Tugboat Owned by PT. Nusantara Terminal Terpadu | Benny CAHYONO, Muswar MUSLIM, Danny FATURACHMAN, Achmad DJAENI and Agoes SANTOSO | ME-06 |
| 21.00 | Manoeuvring Support for Ships by Simulation-Augmented Methods–On-Board and From the Shore | Knud BENEDICT, Michael GLUCH, Sandro FISCHER and Michèle SCHAUB | ME-07 |
| 21.20 | Designing of Control Trajectoy for Fulfilling Berthing of Ship's Movement from the Naval Base to the Dock at Tanjung Perak Port Surabaya | Agoes A. MASROERI, Aulia S. AISJAH, Aries SULISETIYONO, Syamsul ARIFIN, Randika GUNAWAN and Gyan YUSUF | ME-08 |

## DAY TWO
## Saturday – October 25, 2014

| Time | Title | Authors | Code |
|---|---|---|---|
| | Chair of Session-3: **Prof.Dr. Sue Molloy** | | |
| 11.10 | Effectiveness of Homogenization Equipment on Very Large Crude Carrier Vessel | F.A. ADNAN, H.F. NORDIN, O. YAAKOB, A.S.A. KADER, A. MAIMUN and N.M. ALI | ME-09 |
| 11.30 | Baseline Signal of Crack Shaft Propeller with Acoustic Emission Technique | Novitha L. Th. THENU, I Made ARIANA, Achmad ZUBAYDI and Dhany ARIFIANTO | ME-10 |
| 11.50 | Energy Saving Effect of Installation of Roof Shade at Reefer Container Storage Yard | Muhammad A. BUDIYANTO and Takeshi SHINODA | ME-11 |

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|---|---|---|---|
| | Chair of Session-4: **Prof.Dr. Karsten Wehner** | | |
| 13.00 | Opportunities for the Ocean Technology Industry in Tidal Power | Sue MOLLOY, Craig CHANDLER, Jim HANLON and Joe HOOD | ME-12 |
| 13.20 | Prototype Development of the IHL Wave-Current Rotor Turbine | ERWANDI, Afian KASHARJANTO and Daif RAHUNA | ME-13 |
| 13.40 | Quick Installation Process of Design Stern Tube System Ships | Bimo D. PRODJOSOEWITO and Bagiyo SUWASONO | ME-14 |
| | Chair of Session-5: **Dr. Wolfgang Busse** | | |
| 14.00 | Energy Harvesting and Battery Management Systems Development for a Solar Powered Boat Application | Ahmad NASIRUDIN, Ru-Min CHAO and Shieh-Xin CHEN | ME-15 |
| 14.20 | Experimental of Untwisted Sail of Ship in Wind Tunnel Test | Aries SULISETYONO and Ahmad NASIRUDIN | ME-16 |
| 14.40 | Analysis of Tension and Mooring Placement on Sea Wave Power Plant with Pendulum System | Irfan S. ARIEF, Harus L. GUNTUR, Tony BAMBANG and Ede M. WARDHANA | ME-17 |

# QUICK INSTALLATION PROCESS OF DESIGN STERN TUBE SYSTEM SHIPS

**Bimo Darmadi Prodjosoewito[1], Bagiyo Suwasono[2]**
**[1]Shipping System Engineering - Hang Tuah University, dbimops@gmail.com**
**[2]Naval Architecture - Hang Tuah University, bagiyo.suwasono@hangtuah.ac.id**

## ABSTRACT

The process of implementation of *stern arrangement* in the form of a stern tube or shaft tube on new vessel construction requires precision with a high degree of accuracy because it will be a matter of vessel performance and endurance.

The problem is the impact of the implementation process of new vessel construction requires large funds and considerable time. Necessary to find the effort to be able to solve this problem

It has been found that the new method is that the form of construction engineering a new model of shaft tube or stern tube that allows the implementing process of the installation construction very fast.

Further testing needs to be done by the laboratory using torsion testing machine and mathematical calculations to ensure proper use of the new construction at the new vessel building widely in the community; the results of a study that tested the feasibility engineering to be applied in the community

The results of the research can be disseminated through electronic and non-electronic media then patented, also the information to the Bureau Classification of Indonesia as a supervisor agency construction of a new vessel in Indonesian and foreign regulatory agencies.

Keywords: *stern arrangement, stern tube*

## INTRODUCTION

The process of implementation of *stern arrangement* in the form of a stern tube or shaft tube on new vessel construction requires precision with a high degree of accuracy due to performance issues related to the vessel and resistance (Baxter). The problem is the impact of the implementation process of the development in the form of a *stern tube arrangement* that requires large funds and considerable time; Necessary to find the effort to be able to solve this problem.

It has been found that the new method is that the form of construction engineering a new model of shaft tube or stern tube that allows the implementing process of the installation construction very fast.

In conventional construction, or in accordance with the old rules, stern tube material will be connected directly to the hull using welding (BKI Rule Book, 2006). Then wait until the cold deformation is not expected to happen again, there was a local lathe so that the diameter of the hole reaches the size of the bearing. This process is done in the field and requires a long time, and very disturbed weather.

In new construction which is connected to the body of the stern tube is a vessel with a space between 10-20 mm on diameter of stern tube. Splicing still uses welding. Stern tube is made in workshops put into the home with ease because there is a space as wide as 10-20 mm and then slit casted using *orange chock fast* after straightened (*alignment*). Thus, the stern tube installation process only takes about 2 hours.

This new process requires a permit from the bureau classification for general use. Therefore, research is needed to test the feasibility of using torsion testing machine and mathematical calculations.

By knowing the results of the calculation will provide information systems support the ability of the tube which is the stern tube bearing system support to the propulsion system of the vessel. System reliability can be ensured by accurate so socialization is widely use the new system can be ensured as well.

## RESULT AND DISCUSSION

Shearing resistance tube with *chock fast* can be calculated by general formula:

$M = F * R ................(NewtonM).$

$F = \tau * A ..................(Newton).$

$M = \tau * A * R ...........(NewtonM).$

Calculation of stern tube:

The calculation is based on the calculation of the stern tube diameter propeller shaft vessel using the formula taken from the BKI construction regulations as follows:

a. Diameter propeller shaft ship

$$d = k.\sqrt{\frac{pw}{n\left(1-\frac{dl}{da}\right)}}.cw$$

b. Sheath thick shaft B = (0.003. $D_{shaft}$) + 7.5 mm

c. Plain bearings

Rear bearing length: L = 4 $D_{sahft}$

Bearing length: L = 1.5 $D_{shaft}$ front

Thick plain bearings: t = 0.1 $D_{shaft}$

Thickness of the bearing: T = (0.85 to 1).t

From the above formulation we can get the required size of the *stern tube* then built several units as a test sample.

The issue occurs during the implementation process of new vessel construction has been implemented in 1983 At the time the new vessel development of KT. "Anila 1" belongs to the port companies, the difficulties encountered problems of lack the necessary portable lathe. The process of implementation of the *stern arrangement* (figure 1) on the construction of new vessel require a high degree of accuracy regarding vessel performance problems, other than the main one is the safety of the vessel on the voyage at sea (Construction Rule of Book Bureau Classification of Indonesia). The process of implementation of the development begins with the installation of stren materials on stern tube using electric welding which tends to lead to deformation (Wiryosumarto, Harsono) in connection system.

Subsequently collinear arrangement that should be repeated when the *portable* lathe work to obtain a centric hole shaft tube (Baxter, B, MSc, CEng, Marine, MI Mare). The process of this work requires large funds and considerable execution time.

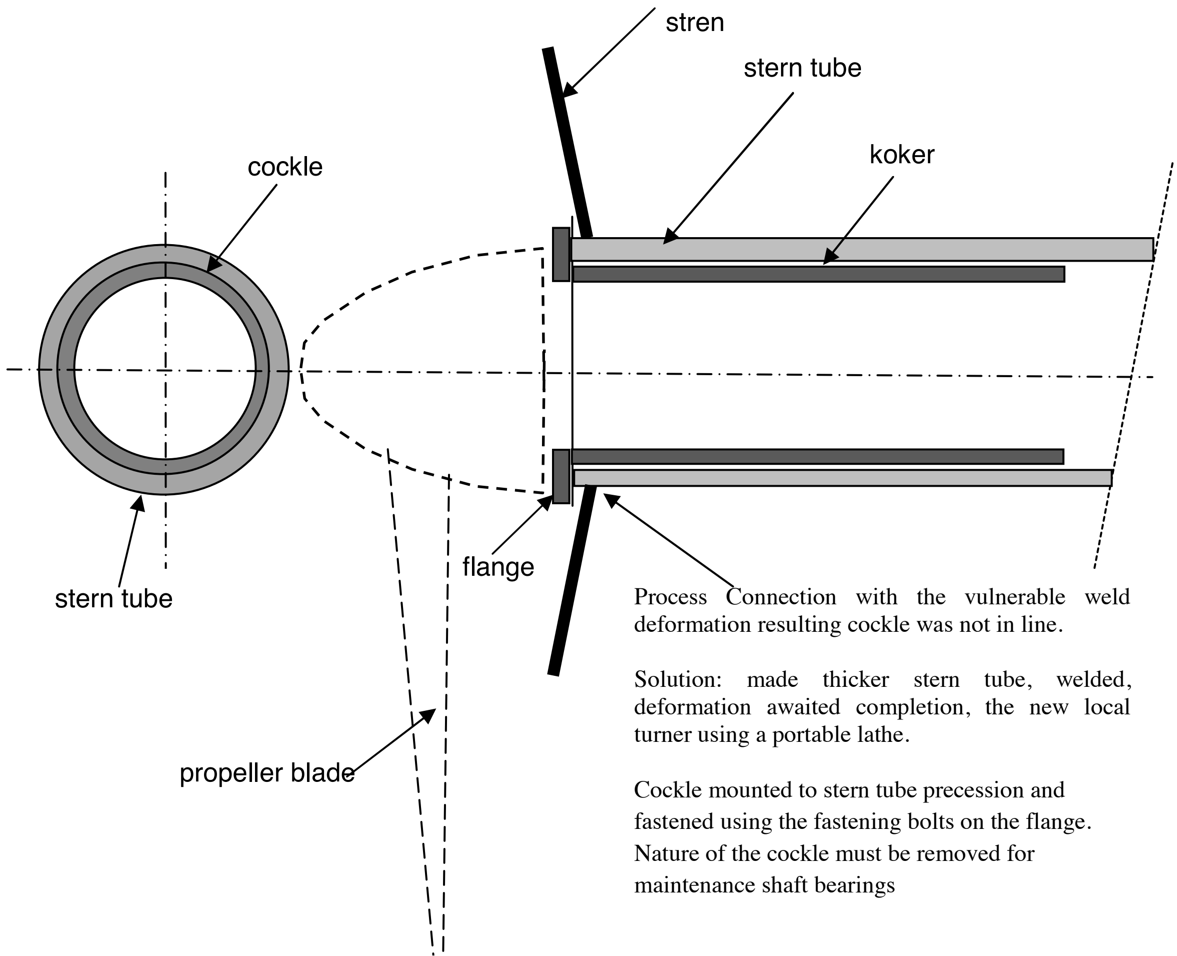



Fig 1. Stern arrangement construction with conventional method appropriated Classification rules

The new method is applied where the installation process although it requires or collinear alignment process, but the implementation does not need to be thorough. The process of welding the tubes on the stern construction can be carried out quickly because of errors caused by welding deformation can be tolerated. Furthermore shaft tube inserted into the shaft tube then slit and filled them with a space that can use *orange chock fast* or cement or such material.

Design Method of Quick Setup vessel of *Stern Tube* process was created to help solve the problem of implementation of new vessel building jobs. Home tube made of thick-walled steel pipe. Home construction of stern tube mounted on the stern using welding in accordance with the applicable rules of construction classification. Therefore, the implementation of the fixed installation or inspection collinear *alignment*, but the process does not need to be meticulous execution. A container (Figure 2) is made complete in the workshop in accordance with the design and classification rules. Furthermore, containers inserted into the tube home and in your set, or collinear alignment settings should really perfect to use set screws. Setup process is easy to implement and can quickly be completed within a few hours.

To establish the position of containers on the shaft, then into the gap between the tubes with the shaft tube will concrete *chock fast* as function of fixed bearing.

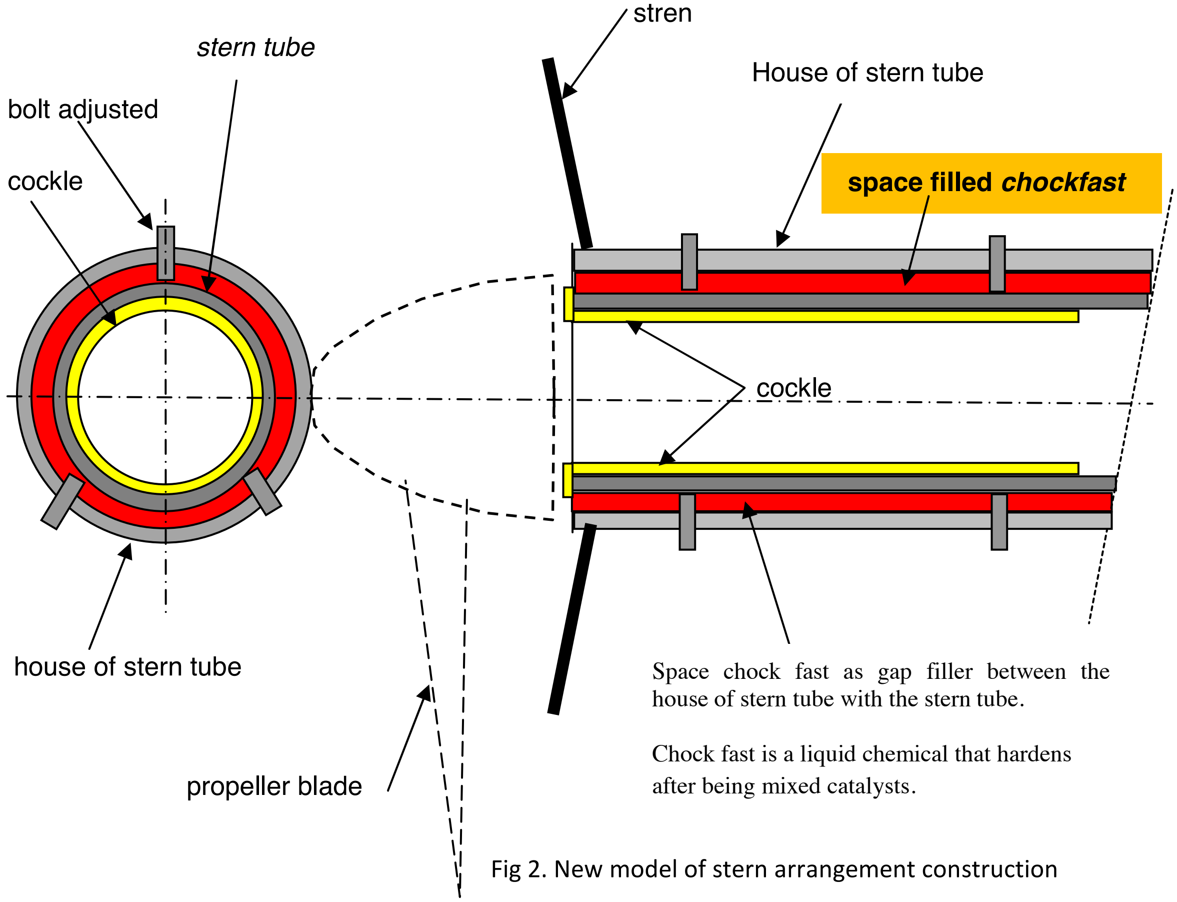



Fig 2. New model of stern arrangement construction

Install Process Engineering Application of Tubes Quick vessel Propeller Shaft needs to pass through dissemination of research and testing before widespread application and receive approval from corporation such as the BKI and other classifications. This research to determine the ability of the tube carrying the containers to the power shaft torque propeller shaft due to rotation of propeller; This research will be conducted in the laboratory techniques FTIK Hang Tuah University uses torsion testing machine.


Fig 3. Torsion testing machine

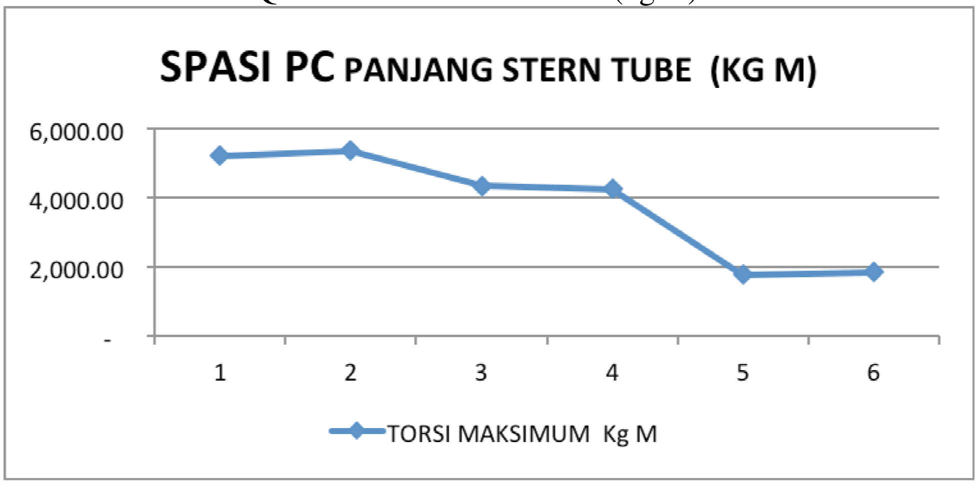
Subsequently made some shaft tube and multiple tube filling containers with a space between (see figure 2) which is *chock fast* main, cement, and fiberglass. Tests conducted each 3 times, made the observation that the size of the torque moment magnitude can be observed. Start the occurrence of cracks can be seen on the manometer mounted on the test machine (Figure 3).

Fig 4. Test Material

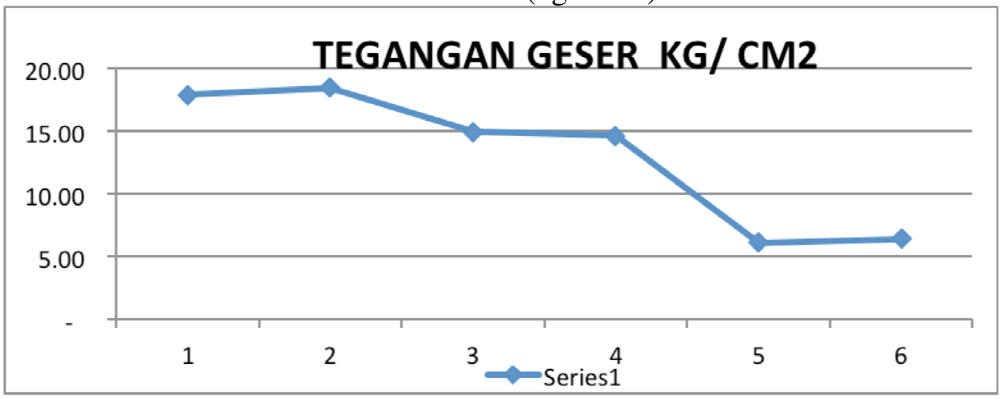
Test tube filled spaces between the cement tubes with *stern tube*. Specifications mixtures of cement and sand with a ratio of variation 1: 2 then 1: 3 and 1: 4.
Furthermore Variations using glass fiber spacing is repeated 3 times.
Last variations using space *orange chock fast* repeated 3 times

Diagrams are monitored is a big moment diagram of the engine torque required to break the connection between the shaft tube spacing and the shaft tube. Wide spacing is concrete with a mixture of sand and cement with ratio 1: 2 then 1: The next 3 ratio of 1: 4.
Furthermore, with spaces and Chock fast fiberglass.
The next diagram of shear stress between the shaft tubes with the home tube
Tube size is: 15.24 cm diameter and 50 cm long.
The test results are shown by the diagram is as follows

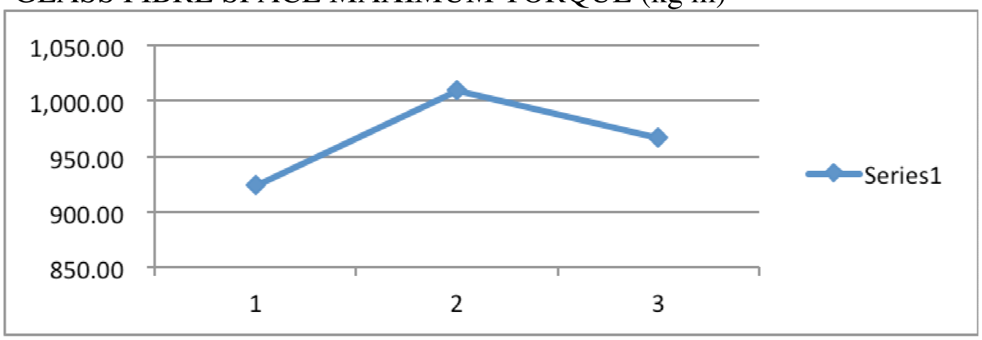
MAXIMUM TORQUE SPACE CONCRETE (kg m)



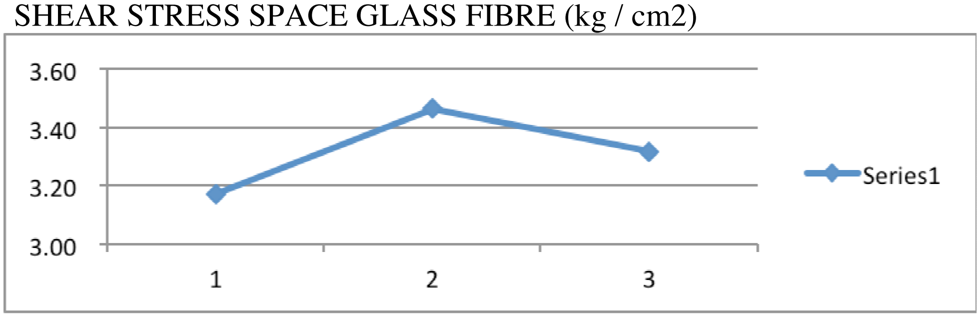
CONCRETE SHEAR STRESS SPACE (kg / cm2)



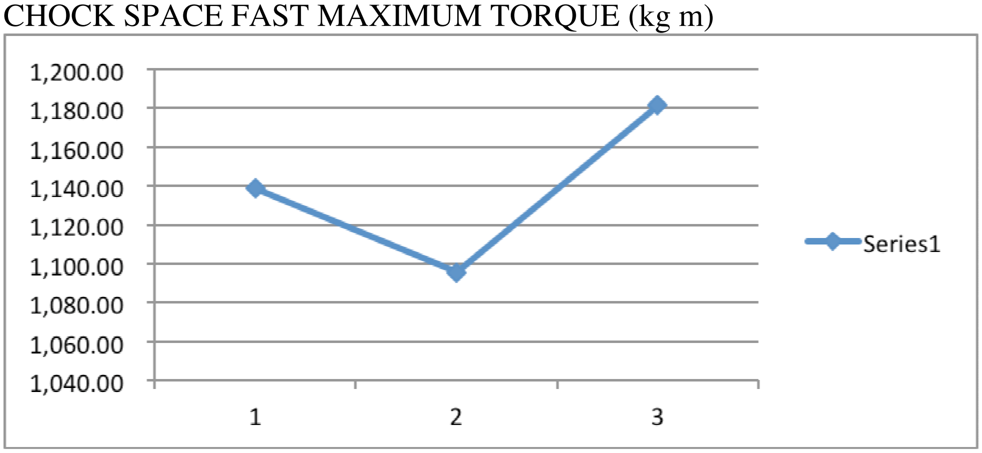

GLASS FIBRE SPACE MAXIMUM TORQUE (kg m)



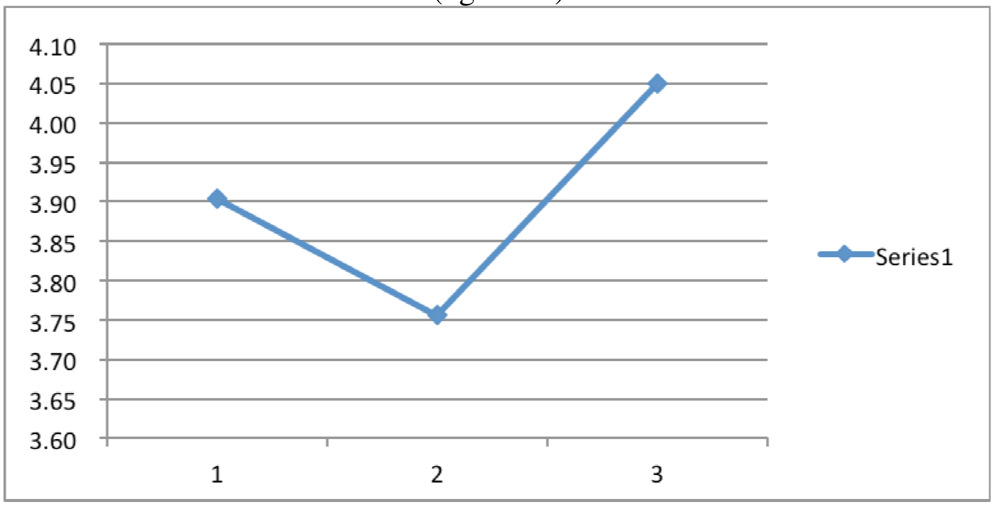

SHEAR STRESS SPACE GLASS FIBRE (kg / cm2)




CHOCK SPACE FAST MAXIMUM TORQUE (kg m)



SHEAR CHOCK SPACE FAST (kg / cm2)




**CONCLUSION**

1. Test results showed that the spacing between the stern tube with the tube using a mixture of cement concrete sand ratio of 1: 2 results in the largest shear stress 18 kg/cm$^2$, mixture of cement sand ratio of 1: 3 generates a shear stress of 15 kg/cm$^2$, mixture of cement sand ratio of 1: 4 produces a shear stress of 7 kg/cm$^2$
2. The test results showed that the spacing between the stern tubes with a fiber glass tube produces the largest shear stress 3 kg/cm$^2$
3. The test results showed that the spacing between the stern tube with the tube using fast chock produce the largest shear stress 3.8kg / cm2
4. In fact the use of concrete spaced more sturdy but takes a long petrified, which if using a hardening agent needs to be 10 days and when not to use hardening petrified takes 28 days.

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