

DAFTAR PUSTAKA

CristenKnak, 2000, *Diesel Motor Ships Engine and Machinery*, G.E.C GAD Publisher. Copenhagen.

HariwijayaMohdan Triton P B, 2007, *Teknik Penulisan Skripsidan Thesis*, Publisher, Yogyakarta

Instruction manual book for, *DOOSAN SULZER 7RT-FLEX96C DIESEL ENGINE*,

Karl W. Stinson, 1981, *Diesel Engineering Handbook*, Ohio State University; By Diesel Publication, Inc

P. Van Maanen, *Motor Diesel jilid 1*, Jakarta.



DAFTAR RIWAYAT HIDUP



Nama : Raxca Bayu Aji
Tempat, Tanggal Lahir : Wonogiri, 29 Januari 1994
Agama : Islam
No. telp : 085741242888
Alamat : Cungkrung 04/ 01,
Mojoreno, Sidoharjo,
Wonogiri

Nama Orangtua

Ayah : Sudarno
Ibu : Surati
Alamat : Cungkrung 04/ 01, Mojoreno, Sidoharjo,
Wonogiri, Jawa Tengah.

Riwayat Pendidikan

Tahun 2001 - 2006 : SD NEGERI 2 MOJORENO
Tahun 2006 - 2009 : SMP NEGERI 2 SIDOHARJO
Tahun 2009 - 2012 : SMK NEGERI 2 WONOGIRI
Tahun 2012 - 2013 : UNIVERSITAS DIPONEGORO
Tahun 2013 - Sekarang : POLITEKNIK ILMU PELAYARAN Semarang
Tahun 2015-2016 : Praktek laut PT. KORIN GLOBAL MANDIRI
(MV. HANJIN GDYNIA)

Lampiran 1

Main engine normal condition

DOOSAN - SULZER

Sheet 5-2

DOOSAN		Engine type		7RT-flex96C		Project		HJS1663		Engine No.		NL-1926		Testbed							
Layout power(bhp)		49680		Speed		102.0		Client		SHI		Hull No.		1663							
Turbochargers		Specifications		EW3G37DCD8J2				Piston stroke		2500mm											
		Maker		MHI		1		30720		Water brake		ZOLLNER, 22n2n316f									
		Type		MET83SEII		2		30721		Speed Controller		KMK, AC-C20 DGU									
		Nmax		11300 rpm		3				Atomizer		20-001251-4, EXE 227									
		Tmax		580 °C		4				Firing order		1-6-3-4-5-2-7									
Lub.oil brand		Cylinder oil		MOBIL GARD 570				Fuel oil brand		Viscosity		10.40 cSt at 40°C		Specific Gravity							
		Circulation oil		SK SUPERMAR AS						Oil brand		BUNKER-A		Heat value(kcal/kg)		10041					
		Turbo oil		SK SUPERMAR AS						Density at 15°C		0.9029 Sulphur %		0.22		Water ppm		154			
Load(%)		50		Date		2007.10.05		Meas. time		12:25											
Engine speed (r/min)		81.0		Injection Nozzle		ALL		Humidity(%)		55.8											
Water brake (kNm)		2155		Fuel Command		48.5		Ambient pressure (mmHg)		760.0											
Engine power (bhp)		24840		Actuator Set/A/B		57/55/55		Ambient temp. (°C)		26.0											
VIT / FQS		-0.8/0.0		Exh. Open/Close		122.8 / 242.4		CCO-3 control v/v index		-											
Local gauge		Pressure (kg/cm ²)								Temperature(°C)											
		Main lub. oil Inlet	Crosshead lub. oil Inlet	Axial Detuner Free/Driving	Piston cooling oil	Servo Oil Pump Inlet	Turbo oil inlet	Jacket cooling water	Fuel oil Inlet	Spring air	Main lub. oil inlet	Fuel oil inlet	Thrust pad (AH/AS)								
		5.7	11.8	5.2/5.2	5.7	5.2	1.8/1.8	4.1	8.0	6.8	38	32	40								
Cylinder condition		Maximum pressure bar		Compression pressure bar		Temperature(°C)				Air cooler											
						Exh.gas cyl. outlet		J.C.W Inlet		P.C.O Inlet		Pressure (mmAq)		No.1		No.2		No.3		No.4	
								71		38		50.0		55.0		Average		53			
		Average		95.0		60.1		315.9		77.6		C.W (kg/cm ²)		Average		1.7		Average air inlet		83	
		No.1		94.0		60.0		315		77		Air Inlet		83.0		83.0					
		No.2		94.0		60.0		318		79		Temperature (°C)		Inlet		22.0		22.0			
		No.3		95.0		60.0		321		77		Cooling water		Average C.W Inlet		22					
		No.4		94.0		61.0		313		77		Inlet		22.0		22.0					
		No.5		96.0		60.0		308		78		Outlet		26.0		25.0					
		No.6		96.0		60.0		325		78		Scavenge air Pressure		bar		0.69					
		No.7		96.0		60.0		311		77		mmHg		518							
		No.8										Temperature (°C)		26.0							
No.9										Fuel Consumption (g/bhp.h)		Measured		128.17							
No.10										ISO Condition		126.15									
No.11																					
No.12																					
Turbo chargers																					
Speed (r/min)		Pressure				Temperature(°C)															
		Air filter ΔP (mmAq)	Blower outlet (bar)	Turbine inlet (bar)	Turbine outlet (mmWC)	Blower inlet air temp.	Exhaust gas turbine		Lubrication oil		Cooling water T/C outlet										
		Inlet	Outlet	Turbine	Blower	Inlet	Outlet	Turbine	Blower	Turbine	Blower										
No.1		5817	8	0.67	0.48	30	29.4	411	350	45											
No.2		5814	9	0.69	0.49	30	29.3	420	344	45											
No.3																					
No.4																					
Average		5816	9	0.68	0.49	30	29.4	416	347	45.0											
Cylinder oil																					
Cylinder Oil Consumption				1.50				g/kW.h		1.10		g/bhp.h									
Rail Pressure (bar)																					
Fuel Oil		599		Servo Oil		130		Control Oil		197											

Lampiran 2

TRANSKRIP WAWANCARA

A. Daftar Responden

1. Responden 1 : First engineer

B. Hasil Wawancara

Wawancara yang penulis lakukan terhadap narasumber atau responden yang bertujuan untuk memperoleh data, informasi maupun bahan masukan dalam penelitian yang membahas kerusakan piston dan piston ring silinder no. 2 yang menyebabkan tidak optimalnya proses pembakaran di dalam ruang silinder Berdasarkan hal tersebut wawancara yang penulis lakukan yaitu saat bertugas menjadi *cadet* di MV. Hanjin Gdynia dengan Narasumber atau *First engineer* (Masinis I). Adapun wawancara yang penulis lakukan terhadap Narasumber adalah sebagai berikut.

Wawancara dengan narasumber

1. Responden 1

Nama : Kang Dong Hun
Position : First engineer
Date : 10 oktober 2015
NB : - A/E (apprentice engineer)
- 1/E (first engineer)

A/E	Excse me sir, I want asking something about the main engine ?
I/E	Ok. Go ahead
A/E	What is your responsibility sir ?
I/E	My responsibility as first engineer is the main engine .
A/E	What is the trouble the most happened in main engine ?
I/E	The trouble at the main engine is ring piston and piston is easy to broken
A/E	What happened about piston ang ring piston ?
I/E	That you can see, that now the piston very dirty and you can see ring piston already broken.
A/E	Why that is happened ?
I/E	Because the cooling system inside of cylinder is not good and lubrication also, and maintenance of piston and ring piston is out order so the ring piston is broken.
A/E	What is the impact if the piston and piston ring is broken ?
I/E	That you know the impact if piston and piston ring broken, compression inside of combustion chamber is leakage, combustion inside of cylinder is not perfect, and leakage of lubrication system.

A/E	How can us fixed the problem ?
1/E	We should fixed the problem be cause that is very dangerous for us and also for this vessel. If this causes is happened we as soon as possible stop the machine if we do not stop the machine this damage will be increase.
A/E	How can we doing that ??
1/E	First time is stop the engine, Close all flow and valve which have connected with the cylinder, take off cylinder head from the main engine, and take out the piston if you want to know detail about how to open that you can see at the manual book instruction.
A/E	Doyou have experience about this problem sir ?
1/E	Yes I have, when I was became first engineer I am find to many problem at the vessel, so this causes is familiar to me but only kind of the machinery which have different`
A/E	Thankyou sir, I think enough for this occuation, thankyoau for this lesson and the time can u giving to share your experience and knowledge
1/E	You're welcome. Don't forget to read the instruction manual bookbif you not understand asking to me or another engineer`
A/E	Thank you sir.

Lampiran 3

SHIP'S PARTICULARS

SHIP'S NAME	HANJIN GDYNIA		
SHIP'S FLAG	PANAMA	PORT OF REGISTRY	PANAMA
CALL SIGN	3 F Q V 4	PANAMA CANAL ID	6007421
SHIP TYPE	4,300 TEU / FULL CONTAINER CARRIER		
OFFICIAL NUMBER	40267-09-B	SUEZ CHANEL ID NO.	
CLASSIFICATION NUMBER	KR : 0966065	IMO NUMBER	9389409
ANCHOR CHAIN	PORT 12 SHACKLE	STBD	13 SHACKLE
BUNKER CAPACITY	- IFO : 4940.6 M/T -LSFO : 1220.1 M/T -LSDO : 224.3 M/T		
Overshooting Angle (PORT/STBD)	- Zigzag 10/10 : 3.8 deg. / 3.7 deg. - Zigzag 20/20 : 7.9 deg. / 10.9 deg.		
BUILT	SAMSUNG HEAVY INDUSTRIES CO.,LTD.		
KEEL LAID / DELIVERY	2008.10.22 / 2009.03.10		
OWNERS	H.O. SHIPPING S.A. ADD : 53rd Street East, Urbanization Marbella, MMG Tower, 16th Floor, Panama City, Republic of Panama		
OPERATORS	HANJIN SHIPPING CO., LTD. (Yeouido-dong), 25, Gukjegeumyung-ro2-gil, Yeongdeungpo-gu, Seoul, Korea		
DEMENTIONS : LQA/LBP	261.4 M / 248.0 M	HEIGHT	55.834 M
BREADTH	32.25 M		
DEPTH	19.20 M	DEPTH MAIN DECK	15.541 M
PROPELLER IMMERSION	8.225 M	Cb : 0.66 (summer)	
TONNAGE :	INTERNATIONAL	PANAMA	SUEZ
GROSS	40,466 TON		42,526.43 TON
NET	18,771 TON	33,467 TON	35,256.34 TON
DWT/LIGHT SHIP	51,693.6 MT / 16365.7 MT (12.6M)		
DRAFT:	SUMMER 12.620 M	FREEBOARD 2.921 M	FW 12.860 M, TFW 13.123 M
	WINTER 12.357 M	3.184 M	
	TROPICAL 12.883 M	2.658 M	
MAIN ENGINE	DOOSAN-SULZER 7RT-FLEX96C DIESEL ENGINE M.C.R 49,680 BHP x 102.0 RPM N.C.R 44,712 BHP x 98.5 RPM / PITCH : 8.28M		
G/E / BOW THRUSTER	1500KWx2, 1300KWx2 / 1,600kw (2,200 BHP)		
FUEL CONSUMPTION	128.5 TONS/DAY AT NCR		
RPM	98.5 RPM / NCR	SERVICE SPEED	24.0 KTS
AIR DRAFT (L:AFTMAST-DRAFT MARK)	55.834-[A.D.-(L/LBM)*(A.D.-F.D.)] LBM (LENGTH BETWEEN MARK): 226.7 M L: 41.754 M		
INMARSAT-F ID.NO	773110952 (BRIDGE INM-FBB TEL.) 764894450 (BRIDGE TEL. AT SEA) 764894451 (CAPT ROOM TEL.) 764894453 (E.C.R.) 764894452 (BALLAST CONTROL ROOM AT BERTHING) FAX: 764894454 E-mail: HJGI@HANJIN.COM		
INMARSAT-C ID.NO	NO.1(MAIN) 435650910 NO.2 435650911		
MMSI	356 509 000		
COMPLEMENT	28 PERSON		



Lampiran 4

CREW LIST									
(O) ARRIVAL					() DEPARTURE				
Name of Ship		Port of Arrival			Date of ARR				
M/V HANJIN GOYNIA		NINGBO, CHINA			2016.07.14				
Nationality of Ship		Port arrived from							
PANAMA		PUSAN, S. KOREA							
NO.	FULL NAME	姓名	SEX	RANK	NATIONALITY	DATE OF BIRTH	PLACE OF BIRTH	PASSPORT NO. / SEAMAN BOOK NO.	ONBOARD PLACE / ONBOARD DATE
1	CHO HYUNHUM		M	CAPT	S. KOREA	1954.11.20	GYEONGNAM, S. KOREA	BS2753460 BS761-46320	BUSAN 2016.01.14
2	JANG WOQJONG		M	C/O	S. KOREA	1987.07.17	JEJU, S. KOREA	MS3701316 BS086-01515	BUSAN 2016.03.24
3	JOKO RIYANTO		M	3/O	INDONESIA	1989.12.16	SPAGEN, INDONESIA	A 6423859 E 075689	BUSAN 2016.06.05
4	CHUNG DONGHYEON		M	2/O	S. KOREA	1989.04.27	SEOUL, S. KOREA	M15354347 BS108-04068	BUSAN 2016.03.30
5	ALBERTUS TIANANTA		M	OFF(B)	INDONESIA	1991.04.29	SEMARANG, INDONESIA	B 1713683 Y 035188	BUSAN 2016.01.14
6	KIM YONG WEON		M	C/E	S. KOREA	1956.12.10	JEONNAM, S. KOREA	BS2832617 BS033-00710	BUSAN 2016.03.24
7	SHIN EUNKYOUNG		F	1/E	S. KOREA	1985.06.12	CHUNGNAM, S. KOREA	SR0121703 BS061-02453	NEW YORK 2016.02.12
8	LEE CHANGMIN		M	2/E	S. KOREA	1980.02.27	GYEONGBUK, S. KOREA	M14368519 BS126-00303	BUSAN 2016.06.05
9	KIM CHANGKYU		M	3/E	S. KOREA	1992.08.21	JEONNAM, S. KOREA	M71181444 BS121-01482	BUSAN 2016.06.05
10	ACHMAD SUBAIDI		M	BSN	INDONESIA	1970.09.13	BANGKALAN, INDONESIA	A 9594377 Y 003691	BUSAN 2016.03.24
11	WILSON HAMO LAGUE		M	Q/M	PHILIPPINE	1978.07.20	MAGALLANES, PHILIPPINE	EC9048471 C0687649	BUSAN 2015.09.09
12	MICHAEL PASOK SABUON		M	Q/M	PHILIPPINE	1978.02.24	ZAMBANGA, PHILIPPINE	EC7270366 C0423075	BUSAN 2016.06.05
13	SUPRIATNA		M	Q/M	INDONESIA	1964.03.07	JAKARTA, INDONESIA	A 6360602 Y 016090	BUSAN 2016.03.24
14	JOSEPH MALUMAY ARTATES		M	SLR	PHILIPPINE	1982.11.23	NUMANCA, PHILIPPINE	EC6889213 C0792525	BUSAN 2016.06.05
15	ACHMAD FAUZI		M	SLR	INDONESIA	1985.08.30	LEGAL, INDONESIA	A 6126955 Y 068564	BUSAN 2015.09.09
16	YADI SUPRIATNA		M	OLR1	INDONESIA	1963.04.24	JAKARTA, INDONESIA	A 5293141 X 031845	BUSAN 2015.11.10
17	ABDUL AZIS		M	OLR	INDONESIA	1975.12.14	BANGKALAN, INDONESIA	B 2781843 A 054743	SAVANNAH 2016.04.27
18	BAHARUDDIN		M	WPR	INDONESIA	1979.03.13	SAMPANG, INDONESIA	A 4859661 X 033722	BUSAN 2016.03.24
19	AKHMAD MIZAR		M	C/S	INDONESIA	1974.04.03	BANGKALAN, INDONESIA	A 2460519 X 063522	BUSAN 2016.03.24
20	ROCKY BASTIDA BUENAFE		M	BOY	PHILIPPINE	1985.09.16	LAGUIG, PHILIPPINE	EC3404698 C0379224	BUSAN 2016.06.05
21	NURWURI HANDIYATNO		M	A/O	INDONESIA	1984.10.18	SUKOHARJO, INDONESIA	B 1490678 U 075087	BUSAN 2015.09.03
22	RAXCA BAYU AJI		M	A/E	INDONESIA	1984.01.29	WINDIGIRI, INDONESIA	B 1496107 D 074856	BUSAN 2015.09.03

2016.06.25

CHO HYUNHUM
MASTER OF HANJIN GOYNIA

