

HNO.773 主機廠試

服務機關：中國造船股份有限公司

出國人職稱：勤業工廠副廠長

姓 名：董天琪

出國地區：韓國

出國期間：90年2月

報告日期：90年3月

HNO.773 主機廠試心得報告

報告人：董天琪

一、前言

本公司新造 HNO.773 船，主機在韓現代船廠完成組裝後，通知於 90 年 2 月 8 日開始進行廠試及拆檢。本人奉命會同船東前往檢驗，也希望借此機會參觀廠區及探討有關事宜；瞭解韓國現代船廠為何能成為世界造船產量最大的船廠之一，原因何在？

二、主機廠試說明

1. 90 年 2 月 7 日本人於桃園中正機場與 773 船東 DELMAS 公司技術部門經理 Mr. MICHEL MALANDAIN 及駐本公司代表 Mr. MASSE、Mr. KONOTH 三人會合一起搭機赴韓，抵韓金浦機場後再轉機至蔚山，一路上皆由 DELMAS 公司駐韓代理接機、引導，晚餐後宿於蔚山 Koreana Hotel。
2. 2 月 8 日上午 09:00 抵達現代船廠，隨即於休息室與船廠品保部門負責人員進行檢驗前之討論，除規範中所需執行的項目外，並要求船廠提供有關廠試時所使用之各度量工具之檢驗證書，以保證各項檢驗所得之資料的正確性。船廠均能於試前說明清楚，並提供相關佐証資料。
3. 2 月 8 日檢驗內容主要是：①. Safety device test ②. Load test ③. Governor test 及當日測試結論檢討，並決定第二天的 Overhaul 檢驗項目。
4. 經過第一天的詳細檢驗，共提出 21 項建議如附件；並提出 10 項 Overhaul 的檢查項目 listing 如下：
 - (1). Crankshaft journal main bearing brg no.8
 - (2). Cylinder Liner cyl. no.5
 - (3). Cylinder Cover cyl. no.5

- (4). Piston complete cyl. no.5
- (5). X-Head Pin & Brg cyl. no.5
- (6). X-Head Guide shoe cyl. no.5
- (7). Crank Pin & Brg cyl. no.5
- (8). Cam and Rollers all
- (9). Cam shaft driving chain and chain whell
- (10). Piston rod inspection cyl. 4

5. 第二天(2月9日)主要是針對第一天檢驗實況與缺點，經討論後所議定的項目(如上述 10 項)；經過詳細的檢查提出 14 項改善改進及建議事項，如附件：

6. 第三天上午(2月10日)除討論總結外，尚對第二天有爭議項目的確定。

三、廠區參觀

赴韓之前，原已請陽明公司友人電請該公司駐現代船廠何課長協助安排時間前往參觀。但因此次 773 船東 DELMAS 公司技術部門經理 Mr. MALANDAIN 一同前往；測試期間每天自上午 09:00 至下午 20:00 均親赴現場參與，對測試每個細節討論與讀判均在場表示意見，本人均需到場，以致原與陽明何課長安排好的參觀時間，無法成行至為遺憾。

雖然如此，只好利用每個測試階段間 10 數分鐘的空檔，獨自進入廠區走馬看花瀏覽一番。另外利用機會與船廠外營業部金容吉部長、李采煥部長、品質經營部金光吉次長以及周邊接觸人員，討論我想知道的一些事情；當然只能蓋略知皮毛，如有機會及時間必能深入探討。

關於對現代船廠所見之報告，先前赴韓人員多有敘述；如工作精神佳、整理整頓好、交通管制嚴、重視安全管理以及船段大型化、下水試車完成度高等等...，其所見略同不再重述，相關照片如附。

四、感想

1. 對 DELMAS 船東的感想

(1). 規劃周到詳盡：

從搭機、接機、換機、餐宿等等安排珠絲靡遺，隨身攜帶成套電腦資訊器材，收發相關文件等均經慎密安排，一切作業按計劃執行。

(2). 強烈維護公司利益：

至時常聽人說韓船廠的強勢，船東多為折服。但經過整整兩天來的測試；在討論時，凡有疑問或稍有不合規定地方，均一再返覆提出要求說明與改善且決不退讓，其強勢遠勝韓方。

(3). 敬業精神可佩：

測試檢驗期間，無論大小疑點均能詳細紀錄要求說明；不論空間狹小、油污，發現問題追根究底決不手軟……，全程的檢驗每天由上午九時至下午 7-8 點，除中午午餐略為休息一下外均全心全力投入。

2. 對現代船廠的感想

(1). 責任感與榮譽感是現代船廠成功因素之一

對於上級所交付的任務有著強烈的責任感與企圖心，完成任務是一種榮譽。

(2). 很多人認為韓國船廠甚為強勢，平心而論！韓國產品品質並不見得比本公司產品好，但確比以往大有進步；敢做、敢更新，求長進是其優點。此外策略運用得法，運用形勢逼人就範。

(3). 規劃周詳、動作迅速、重視流程與時程、克服所遭遇到的困難與問題務必達成任務，否則隨後而來的工程必將全面崩潰，其責任之大一定無法承擔。

Shop trial report of Main engine CSBC Hull NO :773.Engine No :AA1377

Date : 06/02/2001 to 10/02/2001

Shop trial of Main engine no :AA1377 for Hull No :773 carried out on 8/2/2001 and overhaul inspection on 9/2/2001 and 10/2/2001.

Following comments were raised and discussed after the shop trial.

Owner comment	Maker reply	Remark
1. Pmax & Poom same for #4&5 and Other unit difference 1or2.B&W's expert comment required.	B&W explained the reason	O.K
2. Main bearing,B.E bearing and X-head bearing temperatures not Measured.	For only Main bearing , cable connection to be completed Onboard and measurement is to be carried out at sea trial With HHI service engineer.	CSBC to provide equipment for H774,775,776,777,778.
3. No :4 unit stuffing box to be opened up and if damage to piston rod, piston rod to be renewed.		Piston removed and rod inspected-O.K, stuffing box lamella To be renewed.
4.No :1 unit stuffing box drain funnel to be adjusted and secured.	Item agreed.	To be completed.
5.Relief door for chain case supporting hinges not provided.	These relief doors have lugs for lifting.	O.K
6. T/C platform and cylinder head platform have excessive vibration. Support etc to be provided and confirmed for normal condition on board.	.Final judgement is to be carried out with the condition on board. Judgement is to be dependent upon the specification of vibration for Main engine.	
7. Main starting valve and slow turning v/v touching engine frame and same being cut for fitting the line. Valves to be fitted with enough gap and the damages to be repaired.	To remove the knotches and smooth shape to be given. Not effected any functional problem in service.	
8. Turning gear motor chain cover vibrating Same to be provided with support.	Item agreed.	To be completed.
9. Oil mist detector was tested and found not satisfactory. Later on same tested and found satisfactory-please explain	Wrong wire arrangement.	
10.Engine hunting heavily on 25% ahead and about 25 RPM fluctuation in Astern running which is not acceptable. Steady running to be demonstrated	it will be confirmed at sea trial.	
11. #4,5 cylinder head top have lot of oil and water leakage, to be rectified up to satisfaction	Item agreed.	To be completed.
12. Fuel valve high pressure pipe touching access stand for unit 3,4,5,6,7. proper clearance to be provided.	Item agreed	to be completed.

13. Hand rail for cylinder head access to be modified.	Item agreed.	To be completed.
14. #5,6 fuel valve high pressure pipe leaking from fuel valve top.	Item agreed.	Completed.
15. vibration damper end cover oil leaking	Item agreed.	To be completed.
16. #5,6,7,8 scavenge drain flange and #2,7 scavenge doors leaking. Gaskets to be renewed.	Item agreed.	To be completed.
17. Cooling water inlet pipe to cylinder head on unit one to be fitted properly.	Item agreed.	To be completed.
18. Rev. counter on local stand not working.	Digital counter will work on board.	
19. Steam tracing line to be steel pipe. All copper pipe to be changed as per specification.	No communication is found to apply steel pipe. Maker (HHI) and licensor (B&W) have been applying copper pipe as the spec.	CSBC to clarify.
20. Nox measurement not carried out at 90% MCR.	Spec. Says 25%,50%,75% &100%. No 90%.	To be measured at 90% for next shop test
21. Oil mist detector to be provided with transparent inspection cover.	Item pending.	To be completed.

After over haul inspection the following comments were discussed and agreed upon.

22. No :5 X-head bearing bottom shell damaged, shell to be replaced and cause to be explained.	Item agreed.	To be completed.
23. reference position marking to be properly performed for every cam,	item agreed.	To be completed.
24. part list including numbers of item to be provided.	Already given to owner.	
25. No :8 X-head guide-observed vertical scoring marks. To be properly polished.	Item agreed.	To be completed.
26. no :4 stuffing box lamelia to be renewed.	If there are defects, will be renewed.	
27. Locking wires, locking plates to be fitted for every bolts. (ie stuffing box fixation etc.)	item agreed.	To be completed.
28. during the shop test of next ME, Nox measurement to be taken, 90% rating included.	Item agreed.	
29. Tuning gear foundation, adjustment to be carried out and shown on board.	Item agreed.	To be completed.
30. Sensor cable layout to be improved cable touching piping.	Item agreed.	To be completed.
31. Main bearing temperature to be recorded from the next shop test (776, 774, 775, 777, 778)	In that case CSBC should be submitted to the device for the test.	CSBC to provide the equipment (agreed by rep.)
32. Governor remote control system hunting, to be corrected/eliminated by proper setting of the governor or others. Reversing of the ME to be set in order to start in reverse running within 15sec To be proved and demonstrated on board.	During sea trial we will consider it.	

33. Final document including IHP, Mech efficiency and fuel consumption curve to be provided. Item agreed. To be submitted.
34. Lifting eyes on crank case to be removed. Item agreed. To be completed.
35. All piston rings & groove clearance check data will be included in shop test result. Item agreed.

SUMMARY :

- No :8 main bearing bottom shell contact area found only about 75%. B&W engineer explained that the contact is still satisfactory. And that No9 bearing condition shall be worse, but No7 bearing condition will be better than the one opened up. For clarification, No 7 Main bearing opened up and checked, found satisfactory. As a result, the Owner will require the overhaul of No8 & 9 bearings after sea trials, in addition to the overhaul of one cylinder.
 - Unit 4 X-head bearing bottom shell white metal found wiped out in one spot. Recommended to renew the bottom shell and to open up no :4 X-head bearing for inspection. Same found in good condition. The reason for the damage is stated as a poor workmanship. As a result, the Owner might require for extensive overhaul after sea trials, in case of doubtful recorded parameters.
 - Unit 4 stuffing box leakage found excessive, unit opened up and piston rod inspected for any damage to the piston rod. Found satisfactory. Lamella of stuffing box to be renewed.
 - Piston rings found sticky on both pistons, after cleaning same inspected-O.K. Ring clearances to be submitted.
 - Cylinder liner, cover, exh.valve etc-satisfactory.
 - All X-head guides except #8 stbd found satisfactory. #8 stbd guide have one vertical scoring, same to be polished.
 - Main bearing temperature to be measured for the next engine, CSBC representative agreed to provide the equipment required for the measurement.
 - NOX measurement at 25%, 50%, 75%, 90% MCR, 100% to be carried out for the next engine (776)
- CSBC to take note of the items 2,19,31 and all items 'to be completed' <3,4, 6→ 8,10 →13, 15→ 18, 21→ 23, 25, 27, 29, 30 > for further action.
 - Attached also find the copy of the comments from the owner.

2011년 4분기 100 TEST BED SCHEDULE

NO	DATE	TEST BED	TEST ITEM	TEST RESULT	TEST STATUS
1	10/10	100	100	100	100
2	10/11	100	100	100	100
3	10/12	100	100	100	100
4	10/13	100	100	100	100
5	10/14	100	100	100	100
6	10/15	100	100	100	100
7	10/16	100	100	100	100
8	10/17	100	100	100	100
9	10/18	100	100	100	100
10	10/19	100	100	100	100
11	10/20	100	100	100	100
12	10/21	100	100	100	100
13	10/22	100	100	100	100
14	10/23	100	100	100	100
15	10/24	100	100	100	100
16	10/25	100	100	100	100
17	10/26	100	100	100	100
18	10/27	100	100	100	100
19	10/28	100	100	100	100
20	10/29	100	100	100	100
21	10/30	100	100	100	100
22	10/31	100	100	100	100

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