船舶维修英语

朱新河　严志军　程　东　李格升　编著

付国强　主审

SHIP REPAIRING ENGLISH

大连海事大学出版社
DALIAN MARITIME UNIVERSITY PRESS

目 录

CHAPTER 1 SHIP HULL'S REPAIR
(船体维修英语)

PART 1 Sentences(维修用语)

Exercise 1 Repair list and expense(修理单和费用)

1. I've come to check with you the items in your repair list.
   我是来和你核对修理单上的项目的。
2. We have some additional repair items. Here is the additional repair list.
   我们有些补充修理项目。这是补充修理单。
3. Please prepare the additional items within two days of the dry-docking of the ship.
   请在船舶进坞后两天之内制作出补充修理单。
4. Let's discuss the items on the repair list one by one.
   让我们一项一项地讨论修理单上的项目。
5. If you have any questions about the repair list, you can talk to our chief officer/chief engineer/personnel on duty.
   如果对修理单你还有什么问题,可以和我们的大副/轮机长/值班人员谈。
6. I think we had better to make some alteration/modification to item No. ××.
   我想最好对××项修理内容做些更动/修改。
7. Please give me some more detailed explanation about this repair item. I don't think it is clearly stated.
   请更详细地给我解释一下这个修理项目,我觉得它说得不清楚。
8. You should strictly follow the instructions stated in the repair list and ensure the quality of every item.
   你们应该严格按照修理单上的要求,保证每个项目的修理质量。
9. The main jobs should be checked or tested in the presence of one of our officers/engineers.
   主要工程应在有一位我们的驾驶员/轮机员在场时进行验收或测试。
10. Whom can I go to if there are any problems during the repair?
    如果修理过程中出现问题,我该去找谁?
11. If there are any problems during the repair, please inform our engineer on duty immediately.
    如果修理中有什么问题,请立即通知我们的值班轮机员。
12. When can you submit your quotation? We'll make our decision according to it.
    什么时候能给我你们的报价? 我们将根据它做出某些决定。
13. I'm afraid you charged too much for this item. It's unreasonable.

恐怕对这一修理项目你要价太高了,它不合理。

14. If a large number of additional cost is needed, you must have our consent at first.
如果牵涉到大笔额外费用,你必须先征得我们的同意。

15. Please check this itemized bill.
请核对一下这份分项账单。

16. Please itemize the accounts according to the order of our repair list.
请根据我们修理单的顺序分项开账。

17. Items 101 to 113 are average repairs. They should be listed separately in the bill.
第 101 到 113 项是海损修理,应另列账单。

18. This item was not carried out, but the expense was not deducted.
这一项目未进行修理,但费用并未扣除。

Exercise 2 Dry-docking(进坞)

1. The ship is going to carry out her voyage repair in the shipyard. It is to be dry-docked tomorrow.
这艘船将进厂进行航修,它明天将要进坞。

2. The ship to be dry-docked for inspecting, derusting, painting and other underwater works. The work also includes tug service, line handling and gangway arrangement.
船舶要进坞检查、除锈、油漆以及进行其他的水线下工程,这些工作也包括使用拖轮、带缆及装设舷梯。

3. Additional repair items can only be decided after the ship is dry-docked and examined.
补充修理项目只有等船进坞并进行检查后才能确定。

4. Before docking, please inform us of the quantity and distribution of the fuel and water on board.
进坞前,请将船上的油、水的数量和分配情况告诉我们。

5. Please empty all the fuel oil tanks except the daily service tank before docking.
进坞前,除日用油柜外,请将全部燃料油柜空出。

6. Please arrange one oil barge with about 170 tons fuel oil for us till our ship undocking.
请安排一艘油驳为我们储存 170 t 燃料油直到我们出坞为止。

7. Please let me know the time of undocking in advance so that we can get everything ready.
请提前告诉我出坞的时间,以便做好准备。

8. Please put off flooding the dock. I'd like to make an overall inspection.
请推迟放水入坞,我想进行一次全面检查。

Exercise 3 Derusting and painting(除锈和油漆)

1. The bottom plates/deck/rusted parts should be cleaned with high pressure fresh water.
船底板/甲板/锈蚀部分应该用高压淡水冲洗干净。

2. The rusty plates should be scraped and brushed/sand-blasted to bare metal before they are repainted.
在重新油漆之前,生锈的钢板应该刮净出白/喷砂出白。

3. The bottom plugs should be removed, examined and renewed, if necessary, then refitted properly.
船底塞必须拆开并检查,必要时换新,然后装回原样。

4. Port and starboard anchors with chains are to be ranged out for rust removal and all joining shackles dismantled, inspected and cleaned.
左右舷锚和锚链都要卸下除锈,各连接卸扣应拆卸检查并清洁。

5. I'm not satisfied with the chipping. Steel plates had been damaged by heavy chipping. You should pay more attention to it from now on.
敲锈的质量不能令人满意。榔头敲得太重,损伤了钢板。以后要特别加以注意。

6. There are some parts where rust hasn't been removed. Please have these places chipped and scraped to bare metal.
有的地方锈蚀没有除去,请再弥补一下,这些地方都要补敲出白。

7. The patches where rust has been removed should be wiped clean before paint is applied.
在涂油漆以前,除锈的部分应该擦干净。

8. It's raining now. Please stop the painting work in the open air.
天下雨了,请停止在室外的油漆工作。

9. Rusted area about 400 m^2 is to be sand-blasted (grade SA-2), and patched with two coats of bottom primer on the bare metal surface. Then the whole area is to be applied with one coat of anti-corrosive paint.
锈蚀部分大约 400 m^2 喷砂(等级为 SA-2),在出白部分涂船底漆两度,然后全部面积统涂防锈漆一度。

10. The bare metal surface near the waterline is to be patched with two coats of bottom primer and one coat of light grey paint.
水线附近出白处涂两度底漆和一度浅灰漆。

11. All paint needed is to be supplied by the owner of ship.
所需油漆由船方提供。

12. Each part of the hull should be examined by the chief officer, and each coating can be applied only with his acceptance.
船体各部分在涂每度油漆前,须经大副检查并获得他的同意。

13. The anchors and chains are to be sand-blasted and applied with two coats of bitumastic solution.
锚及锚链喷砂,并涂水罗松两度。

14. These areas are to be chipped and applied with two coats of red lead paint.
这些部分需敲铲除锈,并涂两度红丹漆。

15. The newly-fitted pipes should be painted.
新安装的管道应该涂油漆。

16. Rusted water way of hatch covers about 40 m in length to be chipped, brushed and applied with two coats of red lead paint and three coats of grey paint supplied by the ship owner.

锈蚀的舱盖流水槽约 40 m 长,需敲铲、清刷,并涂由船方提供的红丹漆两度、灰漆三度。

Exercise 4 Repair work of the deck department(甲板部修理工程)

1. Anchor chains should be proof tested.
   锚链应进行拉力试验。
2. The windlass squeaks when the anchor is hoisted. You had better to have it checked.
   起锚时锚机总是"吱吱"作响,你们最好对它检查一下。
3. The motor of this cargo winch rotates too quickly. It needs readjusting.
   这台起货机的马达旋转过快,需要重新调整。
4. Please measure and record the rudder bearings clearance and hand over to chief officer in triplicate
   测量舵轴承间隙,记录一式三份交大副。
5. The error of the rudder angle indicator is too large.
   舵角指示器误差过大。
6. The rudder blade does not remain amidships while the indicator reads zero.
   舵角指示器为零时,舵不在中间位置。
7. Ship's bottom base line to be sighted and measured. Three copies of record should be handed over to the ship.
   船底基线望光检查测量,记录一式三份交给船方。
8. 20 pcs. zinc plates on rudder blade, stern frame and ship's hull structure to be renewed (30 mm×150 mm×300 mm).
   船体、舵及艉架上的锌板(30 mm×150 mm×300 mm)20 块换新。
9. Thickness of the shell plate in way of B、C and D strakes need to be thickness gauged with ultrasonic instrument (50 spots in total).
   船壳 B、C 和 D 列板用超声仪测厚 (共 50 个测点)。
10. The dented hull plate in hold No. 2 port side (about 150×250 mm) to be faired up in place.
    第 2 舱左舷凹入部分(约 150 mm×250 mm) 就地校平。
11. The bent part of the starboard frame No. 105(12×300/16×130 mm,500 mm in length) need to be cropped and renewed.
    右舷 105 号肋骨弯曲(12×300/16×130 mm,500 mm 长) 割换。
12. The seriously deformed bulkhead plate (12 mm×500 mm×600 mm) between No. 2 and No. 3 holds need to be renewed.
    第 2 舱与第 3 舱间舱壁板 (12 mm×500 mm×600 mm)严重变形割换。
13. One plate (10 mm×200 mm×500 mm) need to be patched on bulkhead in hold No. 2.
    第 2 舱舱壁补钢板(10 mm×200 mm×500 mm)一块。
14. All watertight doors on main deck need to be removed, repaired, refitted and water-tightness tested.
    所有水密门拆下,修后装复,并进行水密试验。

15. All sponge rubber packing for watertight doors(10 mm×200 mm×500 mm, 45 m in length in total) need to be renewed.
所有水密门的多孔橡皮密封垫(10 mm×200 mm×500 mm,总长 45 m)换新。

16. 4 eccentric rollers and 10 top pins of the hatch covers need to be renewed.
舱盖的 4 只偏心滚轮和 10 个销钉换新。

17. Watertightness test need to be carried out to the satisfaction of chief officer after repair.
修理结束后,进行水密试验,至大副满意。

18. New wooden hatch cover boards of the following specifications need to be supplied.
供应下列规格的新木舱盖板。

19. Both ends of the board need to be covered with galvanized steel plate.
舱盖板两端需用镀锌钢板包好。

20. The steel wire grooving on the hatch coamings need to be built up by welding and ground smooth.
舱口围壁上的钢丝绳拉槽焊补并磨平。

21. 20 bent steps of the ladders need to be straightened up in place. 10 fractured steps to be renewed.
20 根弯曲的舱梯踏板就地矫直,另外 10 根断裂需要换新。

22. The defective and missing cargo batten boards (50 mm×150 mm, about 200 m in total) need to be renewed. 150 pcs. cleats need to be renewed and 80 bent cleats need to be faired up.
破损及短缺的货舱护肋木(50 mm×150 mm,共约 200 m 长)换新。150 只护肋木卡钩换新,80 只弯曲的卡钩矫平。

23. The following tanks need to be derusted, wire-brushed, cleaned and applied with two coats of special ballast tank paint (supplied by the ship). The manhole bolts and packing need to be renewed if there is any damage. Hydrostatic test need to be carried out in dock after completion.
下列水舱除锈、钢丝刷清刷、清洁、涂特种压载水舱漆(船方提供)两度。人孔门螺栓及衬垫如有损坏换新。完工后在坞内进行灌水试验。

24. Fresh water tanks need to be cleaned, lose cement need to be scraped out, rusted parts need to be derusted by chipping, then cleaned with fresh water-cement washes the whole area three times, then the tanks should be softened with dry ice.
淡水舱清洁,铲去松脱的水泥,锈蚀部分敲铲除锈,并用淡水冲洗,并涂水泥三度,然后,用干冰软化处理。

25. All sheaves and rollers of the life boat davit need to be overhauled, cleaned, greased and reassembled.
所有救生艇吊柱的滑轮和滚轮拆开检查、清洁、加油并装妥。

26. All brake linings and bands of life boat winch need to be renewed.
救生艇吊机的所有刹车带及刹车片换新。

27. Two 12-person inflatable life rafts need to be sent to service station, opened up, inspect-

ed, equipment renewed as found necessary, repacked and refitted in position.
两个 12 人气胀式救生筏送专业服务站,打开检查,必要时换新装备,封妥装复原位。

28. Life raft inspection certificate of to be delivered to chief officer in triplicate.
救生筏检查证书一式三份交大副。

29. Goose necks, topping lift blocks, cargo blocks and heel blocks of the derricks need to be dismantled, overhauled, measured, well greased, painted and then reassembled in order.
鹅颈头、千斤索滑车、吊货滑车以及引导滑车解体、检查、测量、加油、涂漆、修理损坏处,然后装复。

30. The derrick needs to be load tested according to the rule's requirement (6.25 tons for single boom of 3/5 tons derrick, 12.5 tons for single boom 3/10 tons derrick).
按规范进行吊杆负荷试验(3/5 t 单杆试验 6.25 t,3/10 t 单杆试验 12.5 t)。

31. All measuring records and load test reports need to be handed over to chief officer in three copies.
全部测量记录及负荷试验报告一式三份交大副。

32. All cargo wires and topping lift wires need to be brushed, cleaned, examined and greased.
所有吊货索、千斤索需要刷净、清洁、检查并涂油。

33. Deck fire fighting water pipe (Dia. 80 mm, gal. steel pipe) at port side to be renewed totally about 20 m in length.
左舷甲板消防管(直径 80 mm 镀锌钢管)部分换新,约 20 m 长。

34. One choked bilge sounding pipe in hold No. 2 need to be freed.
第 2 舱一根测深管堵塞,需疏通。

35. One section of fresh water pipe (Dia. 25 mm×4 m) and one stop valve (Dia. 25 mm) in the crew's bath room need to be renewed.
船员浴室一段淡水管(直径 25 mm,长 4 m)以及一只截止阀(直径 25 mm)换新。

36. Two pcs. of window glass in wheel house need to be renewed (6 mm×866 mm×59 mm, toughened glass).
驾驶台两块前窗玻璃换新(6 mm×866 mm×59 mm,钢化玻璃)。

37. There's something wrong with the radar. I can't see any echoes on the screen. Would you please fix it for us?
雷达有故障,屏幕上看不到任何回波,能替我们修理一下吗?

38. There are only bright specks but no sweep on the screen of the radar.
雷达的荧光屏上只有亮点,没有扫描线。

39. No rotating sweep can be observed on the screen, but the scanner rotates all right.
屏幕上看不到扫描线运转,但天线运转正常。

Exercise 5 Sentences regarding ship's repair(有关船舶修理的句子)

1. Mr. David, shall we check the repairing list together?
戴维先生,让我们一同核对一下修理单好吗?

2. Has the project of forepeak tank been cancelled?
首尖舱工程取消了吗?

3. Which bulkhead needs to be renewed?
哪些舱的舱壁需要换新?

4. Are there any steel items in the main deck and connect deck?
主甲板及连接甲板有钢质工程吗?

5. Are there any repairing items in the frame and deck girder?
肋骨、甲板纵骨有修理项目吗?

6. Let's go to inspect the top side tank, shall we?
让我们一起到顶边舱去勘验工程,好吗?

7. Does the ballast water in the T.S.T. have been drained up?
请问顶边舱内压载水排干了吗?

8. When shall we inspect the inner bottom items?
什么时候勘验内底工程?

9. Are there any steel items in the aft-peak tank?
尾尖舱有钢质工程吗?

10. May this strake be replaced by 1.8 m?
这列板换成 1.8 m 板好吗?

11. Specification of domestic armor plate is long 8 m and breadth 1.8 m.
国产的钢板规格为长 8 m、宽 1.8 m。

12. Can this armor plate be exchanged to welding line?
这列钢板换到焊缝处好吗?

13. How much is the thickness of this slope board?
请问这块斜坡板的厚度是多少?

14. The thickness of domestic armor plate is even; can use the 12 mm thick steel plate instead of 11.5 mm?
国产钢板的厚度为偶数,请问用 12 mm 板替换 11.5 mm 的板,行吗?

15. What is the material of this platform board?
请问这层平台板的材质是什么?

16. Does the hatch cover need to be repaired on the ground?
请问舱盖需要下地修理吗?

17. How many tons does the hatch top board need to be renewed?
请问舱盖顶板需要换新多少吨?

18. Do the hatch cover sealing strips need to be descaled?
舱盖胶条需要清垢吗?

19. Do the hatch launder need to be repaired?
舱盖流水槽需要修理吗?

20. Do the hatch gemel need to be renewed?
舱盖铰链需要换新吗?

21. Do the hatch roller and bearing bushes need to be repaired?
舱盖滚轮及轴套需要修理吗?

22. Are there any repairing items of hatch tracking board?
舱口围轨道板有工程吗?

23. Do the hatch coamings need to be mended locally?
舱口围板需要局部挖补吗?

24. Are there any additional steel items?
钢质工程还有追加的吗?

25. Chief officer, please lend the "essential structure plan" and "mid-ship section plan" to me.
大副,请把"基本结构图"、"中剖面图"借给我。

26. This is the fabricating technology for strengthening bulkhead of hold No. 1, please check up.
这是1舱舱壁加强的施工工艺,请核对。

27. Root of weld is 8 mm.
焊脚为8 mm。

28. Clearance of assembly is 1～3 mm.
装配间隙为1～3 mm。

29. This is the welding sequence of outboard mending, please review and sign.
这是外板挖补的焊接顺序,请审核、签字。

30. This is the mending procedure of crane jib, please review.
这是克令吊吊臂挖补工艺,请审核。

31. Is there any further repairing job for this project?
请问还需要哪些修理工作?

32. The fit up of the bulkhead has finished, shall we go on have a look?
舱壁已经装配结束,让我们一起去检查好吗?

33. The project of cargo hold frame have finished, please check up.
货舱肋骨已完工,请检验。

34. The air-tightness test of oil tank have finished, please check.
油舱气密试验已完成,请检验。

35. Let us survey the vacuum test of outboard, shall we?
外板真空试验,让我们一同去检验?

36. Let us survey the water-ejection test of the hatch cover, shall we?
舱盖冲水试验,让我们一同去检验?

37. Is that oil tank opposite to this bulkhead?
请问这道舱壁的对面是油舱吗?

38. Can you remove these jerricans?
能把这些油桶移走吗?

39. These warm-keeper layers need to be torn down.

这些保温层需要拆掉。

40. Do you have any request to our safety work?
您对我们的安全工作还有什么要求吗?

41. This is the finished work list of this ship, please check up and sign.
这是这条船的完工单,请审核验收。

42. Do you have any different opinions to the finished work list of hatch cover project?
您对舱盖工程完工单还有不同意见吗?

43. If you have no questions about the finished work list, please sign.
如果您对完工单没有异议,请签字。

44. Hope to serve for your company often.
希望经常能够为贵公司服务。

45. Do you satisfy with our hull workshop project works?
您对我们船体车间的工程还满意吗?

PART 2 Reading materials(阅读材料)

Text 1 Introduction:kinds of repair

When a ship leaves her building yard to go into operation, she will need to be kept at all times in a well-maintained condition maintenance work being normally done by the crew themselves. But when the ship has been in operation for a certain length of time, damage resulting from natural causes (perils of the sea) or through human factor is bound to occur, and she will then need repairing.

If the ship sustains damage when making a voyage, she will need to undergo voyage repair, which is temporary in nature is therefore also known as temporary repair. If, according to requirements of Registration Bureau, the ship is to be overhauled once a year, such overhauling is known as minor repair or annual repair. In order to keep up her rating once in every so many years, the vessel needs to enter dock to undergo thorough overhaul and major repair.

Whether it is voyage repair, annual or major repair, the ship's officers or engineers will have to make out the repair lists. Repairs are often carried out in foreign shipyards and the repair lists are generally written in the English language.

To save money on repairs , when repair lists have been made out, the ship's officer or engineer may ask for estimates or tenders from several different shipyards and compare their price. The one that quotes the lowest price may then be given the job to do.

To collect payments, on completion of repairs, the contracting shipyard then presents the certified repair bills together with invoice to the owners as their agents for payments, thereby completing the whole formalities.

It is clear therefore that an ocean-going officer or engineer should be able to write, read and certify in the English language the various papers connected with ship's repairs.

New words and phrase

repair list	修理单
voyage repair	航修
annual repair	岁修
guarantee repair	保修
occasional repair	临时性修理
permanent repair	永久性修理
additional repair	补充修理、加账修理
major repair	大修
average repair	海损修理
minor repair	小修

Text 2 General conditions and specifications for dry-docking, repairs and renewals

These specifications are for the dry-docking, repairs and renewals to the "MV ADVANTAGE".

It is understood by the contractor that the work here in specified is to be carried out expeditiously in a good and workmanlike manner and completed in all respects, leaving the vessel ready for sea and loading cargo; that material and workmanship used must be of the best quality throughout; that contractor furnished material must generally conform in size, quality, and details to those originally in the vessel; that repairs must, in every respect, be made under the supervision and entire satisfaction of the attending owner's representative and the representative of the regulatory bodies.

It is further understood by the contractor that all materials requiring tests shall be tested in accordance with the rules of the United States Coast Guard, the American bureau of shipping and other applicable regulatory bodies and must meet their requirements and that all costs for tests and inspections must be borne by the contractor.

If any dispute or difference shall arise relating to, or concerning these specifications, or the meaning thereof, contractor shall perform the disputed work in accordance with the written directions of the owner's representative without prejudice to the rights of the contractor for reimbursement.

Should the contractor require the removal of any parts of the vessel or fittings, engines, boilers, fuel, oil, stores, outfit, etc., the cost of such removal is to be borne by the contractor, and all such removals must be subsequently replaced, and any damage resulting there from is to be made good by the contractor at his expense.

All scrap and contractor furnished surplus material occasioned by the repair shall become the property of the contractor. Notwithstanding the foregoing, pumps, turbines, motors, and other machinery are to remain the sole property of the owner.

Any internal parts specified to be renewed which can be restored to their original condition by

fairing, etc., also any parts specified to be removed for fairing which can be faired in place to the satisfaction of the owner's representative and the regulatory bodies will be accepted; on the other hand, any parts found broken or broken in removal or fairing shall be renewed or replaced by the contractor at his expense.

Contractor shall provide owner and his representatives work access at all times, wherever it is, in preparation or progress, whether on shipyard premises or not. No piece of machinery, equipment or space being worked on shall be closed up or any job be considered complete without prior approval or inspection of owners representative.

The contractor is to fully protect the vessel and owner against any claims for injury to workmen and third parties, also for any damage done to the vessel, her machinery or fittings while the vessel is undergoing repairs.

Contractor will ensure and keep the vessel with legal liability insurance for loss or damage to the vessel, its equipment or movable stores and/or cargo, and general liability insurance for bodily injury or death each in the sum of ten million dollars ($ 10,000, 000.00). Ship repairer's legal liability policy of insurance shall be payable jointly to the contractor and general liability insurance. Evidence of such insurance shall be furnished to the owner. Such insurance policies are kept in force from the time of the delivery of the vessel to contractor to the time of redelivery of the vessel to owner. Contractor shall also maintain workmen's compensation insurance covering all persons employed by contractor on work to be performed hereunder during the period such self-insurance as may comply state law and longshoremen and harbor worker's compensation act. Such insurance shall contain a waiver of subrogation in favor of the owner.

Any particulars in the specification for the work involved are given for the guidance of the contractor, who is, however, to take his own particulars and dimensions, and to be responsible for same, as the intent of these specifications is to renew and restore the vessel generally and specifically insofar as damage is concerned, and restore the vessel to the same good condition as she was in before the repairs and to repair the vessel in accordance with attached specification.

Owner's representative and only the owner's representative may add, cancel, or modify individual specification items in writing as may be required. Any changes to bid prices and time to do the work shall be pursued expeditiously and agreed in writing by the contractor and owner's representative. Such agreement shall specially set forth the change, if any, in the completion of the hereunder. Prices for additional items are to be consistent with bid prices.

Owners reserve the right to engage subcontractors to perform work, furnish services and/or materials not covered by these specifications, The contractor shall permit employees of such subcontractors access to the shipyard and vessel for such purposes.

It is understood that time is of the essence in pursuing the repairs herein. Should owner wish to expedite the work through the use of overtime, owner's representative shall issue such request, in writing, to the contractor as an additional item.

Should the contractor exceed the time agreed on for carrying out the repairs, renewals, or replacements specified or implied, the sum of twenty thousand dollars ($ 20,000) is to be paid by

contractor to the owner as liquidated damages for each and every day in excess of the time agreed for completion of the specified work.

Should the owner discover and advise the contractor in writing of any failure to conform to the standards of the trade and any applicable regulatory bodies or defective material or workmanship provided by the contractor in performance of the work required by the specification within sixty (60) days of the vessel's departure from the contractor's premises, such defects shall be corrected by the contractor at his expense, if practicable, otherwise by the owner at the contractor's expense.

When quoting, you are to advise any local conditions applicable to this vessel regarding dry-docking or repair berth facilities, such as additional costs, draft restriction, or trim requirements for entering the repair berth and dry-dock. Also, advise any local government condition, gas free procedures, time of day, etc., which may prevent the vessel from entering yard immediately on arrival.

The yard is to have competent supervision, satisfactory to the owner, at the site at all times during progress of the work, with authority to act for the yard's management.

The yard shall inform the master on arrival of all yard security and safety regulations that may apply to the vessel while in the yard and to officers and crew entering and leaving the yard and any other information that may be helpful to master and crew during vessel's stay in the yard.

Quotes for each item shall include costs for equipment and personnel supply; this shall include, but is not limited to, transportation of material, tools, staging, crane service, compressed air, burning and welding equipment, testing of all completed repairs, and all other equipment as necessary to complete each item. Upon completion of each item, the work area shall be cleaned to the satisfaction of the owner's representative. All debris shall be removed from the vessel. This service shall be included in the price of each item.

Safety and appropriate signs are to be placed around the vessel and engine spaces to ensure hot work is not carried out in dangerous areas such as fuel lines and fuel tanks that have not been gas-freed. No welding or burning to be done on high tensile steel plates unless specifically directed by owner's representative in writing and proper welding procedure is submitted of ABS for approval.

SAFETY PRECAUTION AND DISPOSAL OF TOXIC/HAZARDOUS MATERIALS

General Precaution

Contractor shall provide continuously adequate protection of the work, owner's property, and adjacent property, and take all necessary precautions to free the work place from recognized hazards which are likely to cause death, illness, or injury to persons or damage to the property.

Contractor shall cause all it's employees, subcontractors, agents, and others under the contractor's control entering the vessel to perform the work or in connection therewith to comply with all applicable health, safety, and environmental laws, ordinance, rules and regulations bearing on or relating to the work there under. These rules and relations shall include, but are not limited

to, applicable standards of occupational safety and health administration, United States Coast Guard, environmental protection agency, and sealift, Inc.

Owner shall not be required to police contractors to comply with any of the fire, safety, health, or environmental rules, laws, regulations, or orders generally referred to herein, and shall not establish or confirm any obligations on the part of the owner under any such rules, laws, regulations, or orders.

Waste Disposal

All wastes removed from the vessel which may be classified as hazardous are to be handled, transported, and disposed of in accordance with applicable laws and regulations

Asbestos

Unless express written permission is obtained from sealift's superintendent, no asbestos-bearing material may be installed on board this vessel. Where feasible, there placement shall be clearly marked as non-asbestos bearing material.

Safety Precaution

All confirmed spaces, tanks, vessels. strainers, etc. with limited natural ventilation are to be provided with forced ventilation prior to entry. These spaces must be certified safe for workers by the marine chemist before entry. If hot work is to be performed, the marine chemist shall certify that the space is safe for hot work as covered in Item 002.

Inspection and Repair Record

The shipyard shall furnish draftsmen and equipment to make necessary sketches and reading reports for all equipment overhauled and inspected in the shipyard period. The record shall consist of all reading of clearances, calibration reports, application records, readings of measurements and major component repair/renewal. Three (3) copies are to be provided to the owner's representative. Inspection and repair record should comprise the following as applicable:

1. Main Engine
2. Tail Shaft, Stern Bearing and Propeller
3. Auxiliaries and Steering Gear
4. Deck Machinery
5. Hull Gauging
6. Paint Application
7. Rudder and Stock
8. Anchor Chain
9. Catholic Protection
10. Major Steel Renewal
11. Heat Exchangers
12. Electrical Inspection
13. Dynamic Balancing
14. Dry-dock Blocks Position
15. Repair Work on the Hatches

16. Repair Work to the Booms

17. Repair Work to the Cranes

The FINAL INVOICE is to be prepared and submitted in the following manner, each specification item is to be listed. Cost segregation to be done as listed below and shown as sub-totals on the final invoice for each item. Each specification item to be laid out with:

1. The description of work done as per specifications.

2. The description of any credits.

3. The description of any additional work done.

All items involving a new design feature will be designated "modification" and listed separately.

All governmental surveys/inspections will be designated as such, i. e. "Aux. Boiler Feed Pumps (ABS/USCG Inspection Requirement)." If an inspection item turns into a repair item, then the inspection item will stand on its own and a new item will be issued for the repair.

Text 3 Typical specifications in the repair list for a general cargo ship

1. DOCK REPAIR

1) Docking

Vessel to be docked for inspection, derusting, painting and other underwater work, and the work also includes tug service, line handling and gangway arrangement.

2) General service

(1) Shore electric power (AC 380 V 50 Hz-300 A) to be furnished.

(2) Cooling water for refrigerators to be connected.

(3) Fresh water to be furnished as required.

(4) Fire line to be connected.

(5) Daily garbage to be disposed of.

3) Hull cleaning and painting

(1) The bottom area from keel to light load line about 2 600 m^2 including rudder, rudder post, stern frame, to be cleaned with high pressure fresh water. The rusted area about 300 m^2 to be sand-blasted (Grade SA-2), and patched with two coats of bottom primer on the bare metal surface. Then the whole area has to be applied with one coat of anti-corrosive paint and one coat of tropical anti-fouling paint. About 50 m^2 in stern part would be applied with anti-galvanic paint instead of A/F.

(2) The boot topping strake, from light load line to full load line, about 1 600 m^2 to be cleaned with high pressure fresh water. The rusted area about 500 m^2 to be sand-blasted (Grade SA-2.5) and patched with two coats of primer and one coat of boo topping green paint on the bare metal surface. Then the whole area will be applied with one coat of boot topping green paint.

(3) The topside about 1 200 m^2 to be cleaned with high pressure fresh water. The rusted area about 200 m^2 to be sand-blasted (Grade SA-1.5) and patched with two coats of primer and one coat of light grey paint on the bare metal surface. Then the whole area to be applied with one coat of light grey paint.

(4) All draft figures, plimsoll marks, ship's names and port of registry to be repainted twice in original color.

(5) Run-off pipes to be connected temporarily for outboard scupper (10 pcs. in total) during time of painting.

(6) All above paints to be supplied by owner. Each part of the hull should be examined by chief officer and obtain his agreement before each coat being applied.

4) Bottom base line

Ship's bottom base line need to be sighted and measured. Three copies of record have to be handed over to chief officer.

5) Zinc plate

20 pcs. zinc plate on rudder , stern frame and ship's hull to be renewed (30 × 150 × 300 mm)

6) Bottom plug

Three bottom drain plugs to be dismantled, examined and refitted. One plug need to be renewed.

7) Thickness measurement

Thickness of shell plate in way of B, C, and D strakes to be measured with ultrasonic instrument (50 spots in total) three copies of record to be delivered to chief officer.

8) Rudder

Clearance of rudder bearings need to be measured and record to be handed over to chief officer in triplicate.

9) Anchor, chain, etc.

Both bow anchors (each 4 590 kg) and chains (Dia. 58 mm) of 23 lengths in total to be ranged in dock and repaired as follow:

(1) The anchors and chains to be sand-blasted and applied with two coats of bit mastic solution (supplied by owner).

(2) 25 center-joining shackles need to be dismantled, cleaned, inspected and refitted.

(3) 30 loose studs to be tightened up.

(4) The first length of both P. & S. anchor chains to be disconnected and reconnected as the last length.

(5) Shackles to be remarked with new seizing wires and red/white paint. Then anchors and chains to be refitted back properly.

(6) Both chain lockers to be cleaned. The rusted parts about 80 m^2 in total at the lower half of lockers, from bottom to 2 m above grating, including grating, need to be chipped and patched with two coats of bit mastic solution. Then the whole area to be applied with one coat of bit mastic solution (solution to be supplied by owner).

10) Storm valve

4 sanitary storm valves to be dismantled, cleaned ground and coated with anti-corrosive paint, then refitted in order.

11) Propeller (Dia. 5 200 mm, 4 blades)

(1) The propeller to be polished and varnished.

(2) One bent blade tip (150×300 mm) to be faired up in place.

12) Tail shaft (Dia. 560 mm)

(1) The clearance between the tail shaft and stern tube to be measured before and after repair, records in three copies to be handed over to chief engineer.

(2) The propeller to be dismantled. One intermediate shaft and bearing need to be removed. The tail shaft needs to be drawn out for inspection and repair. All removals need to be reassembled in order on completion.

(3) The tail shaft to be cleaned, measured and magnetic tested. The brass sleeves on both ends of tail shaft to be skimmed.

(4) The lignum vitae of stern tube to be completely renewed. The lignum vitae in bottom half need to be cut end way of wood.

(5) The stern gland packing need to be renewed with yard's material (50 mm^2, 5 000 mm length).

13) Sea chest

4 sea chests and grids need to be opened, cleaned, chipped and applied with three coats of anti-corrosive paint supplied by owner. The zinc anodes(25 mm×100 mm×105 mm, 8 pcs. in total) in the chests to be renewed. Then the grids to be refitted with new brass nuts after chief engineer's inspection.

14) Sea valve and overboard discharge valve

The following valves to be opened up, cleaned, ground in or skimmed up if necessary, repacked and reassembled in good order. Interior of valve bodies need to be painted with two coats of anti-corrosive paint.

Sea valve ……9 pcs.

Dia. of valve 350 mm……2 pcs.

150 mm……2 pcs.

60 mm ……3 pcs. (Air vent valves)

25 mm ……2 pcs. (Steam valves)

Ovb'd discharge valves……12 pcs.

Dia. of valve 250 mm……1 pc.

200 mm……1 pc.

150 mm……2 pcs.

125 mm……1 pc.

60 mm……1 pc.

50 mm……1 pc.

40 mm……30 pcs.

35 mm……1 pc.

Donkey boiler blow down valve 50 mm……1 pc.

2. DECK DEPARTMENT

1) Ballast water tank

The following tanks to be made rust free, wire brushed, cleaned and applied with two coats of special ballast tank paint (supplied by owner). The manhole bolts and packing need to be renewed if any damage being found. After completion, hydrostatic test to be carried out in dock.

Fore peak tank ……280 m^3

No.2 & 4 deep tank ……180 m^3

No.4 double bottom tank ……80 m^3

2) Fresh water tank

The following fresh water tanks to be cleaned, loose cement (about 20% of whole area) to be scraped out, the rust parts (about 30% of whole area) to be derusted by chipping. Then whole area to be washed and cemented 3 times. The tanks need to be softened with dry ice. Manhole bolts and packings need to be renewed if any damage being found.

After peak tank ……180 m^3

No.2 & 3 double bottom tanks ……120 m^3 each

3) Hold bottom ceiling

The defective bottom wooden ceiling boards under the hatch way of holds No.2 & 3 to be renewed (60 mm×160 mm,300 m in total).

The tank top plates under renewed ceilings to be made rust free by chipping and applied two coats of red lead paint. (paint supplied by owner).

4) Cargo batten

The defective and missing cargo batten boards (50×150 mm,about 300 m in total) to be renewed 150 pcs. cleat to be renewed and 80 bent cleats to be faired up.

5) Ladder in cargo hold

20 bent steps of ladder (breadth 370 mm) to be straightened up in place. 10 fractured steps to be renewed.

6) Hatch coaming

The wire grooving on the hatch coaming to be welded up and smoothed.

No.3 hatch ……35 pcs.

No.4 hatch ……40 pcs.

7) Cargo lashing ring

Following lashing rings to be made and fitted according to chief officer's instruction:

Tween deck on bulkhead……50 pcs.

Tween deck on frame ……50 pcs.

Lower hold on bulkhead……40 pcs.

Lower hold on frame ……60 pcs.

(size: 30 t×160×17 mm)

Tween deck on deck 32 R.B. eye plate ……10 pcs.

8) Hatch cover

The macgregor single pull hatch covers (8 pcs. in total) at hatch No. 3 (15 m×8 m) to be repaired as follows:

(1) The rubber packings to be renewed total about 80 m long according to chief officer's instruction. Packing grooves to be chipped and painted with two coats of red lead paint.

(2) Rusted water way of covers about 40 m in length to be chipped, brushed and applied with three coats of red lead paint and two coats of grey paint (paint supplied by owner)

(3) 4 eccentric rollers to be renewed.

(4) 10 top wedges to be renewed.

(5) 4 lengths of towing chain between two covers to be renewed.

(6) Watertight test to be carried out to chief officer's satisfaction.

9) Wooden hatch cover on twin deck

New wooden hatch boards to be supplied as follows:

75 t×430×1 550 mm, 30 pcs.

75 t×430×2 200 mm, 20 pcs.

Remarks: (1) Both ends of the boards to be covered with galvanized steel plate.

(2) The bolts and nuts need to be galvanized.

10) Hold painting

No.2 & 3 lower holds and twin decks (hold length 24 m each) to be thoroughly washed down with high pressure fresh water , rusted area about 300 m^2 in total to be scraped and two coats of primer and one coat of surface paint of original color to be applied, then the whole area (including bulkhead, shell, deck and pipes) to be applied with one coat of surface paint of original color (paint supplied by owner).

11) Hull construction

(1) The dented hull plate in hold No. 3 port side (about 200×350 mm) to be faired up in place. The bent part of starboard frame No. 102 (12×300/16×160 mm, 500 mm in length) to be cropped and renewed.

(2) The seriously deformed bulkhead plate (12 t×300×800 mm) between No. 4 and No. 3 holds to be renewed.

(3) One doubling plate (10 t×300×400 mm) to be patched on bulkhead in hold No. 2

12) Watertight door

10 watertight doors on main deck to be removed, repaired, refitted and watertight tested as follows:

(1) All sponge rubber packing(15.5 t×35 mm,45 m length in total) to be-renewed.

(2) Packing grooves to be chipped and painted with two coats of red lead paint (paint supplied by owner).

(3) Packing groove coaming to be renewed partly (4.5 t×20 mm,15 m in length).

13) Cargo gear

Two pairs 3/5 tons derrick at hatches No. 1 after port & stb'd and No. 2 fore port & stb'd two pairs 3/10 tons derrick at hatch No. 2 aftar port & stb'd and hatch No. 3 fore port & stb'd

to be repaired as follow:

(1) 8 goosenecks, 8 topping lift blocks, 8 cargo blocks, and 8 heel blocks to be dismantled, overhauled, measured, well greased, painted and repaired, if any, then reassembled in order.

(2) 2 topping lift wires of 3/10 tons derricks to be renewed with yard's material (Dia. 22.5 mm, 110 m in length).

(3) The derricks load test to be carried out according to rule (6.25 tons for single boom of 3/5 tons derrick, 12.5 tons for single boom of 3/10 tons derrick).

(4) All measuring records and load test reports to be handed over to chief officer in three copies.

14) Heavy derrick

One set of "Stulcken" type heavy derrick S.W.L. 60 tons, length 20 m, located between hatches No.2 & 3 to be repaired as follows:

(1) The derrick to be laid down on deck, cargo blocks, span tackles, guide rollers and all moving parts of derrick to be dismantled, cleaned and greased with special grease.

(2) Gooseneck pin to be dismantled, examined and measured ball bearing and glands in the socket of gooseneck to be cleaned, examined, repaired or renewed if necessary, greased and refitted.

(3) Turning accessories on the posts to be dismantled, examined, cleaned, greased, repaired if necessary and refitted.

(4) All cargo wires and topping lift wires to be wire brushed, cleaned, examined and greased.

(5) 66 tons load test to be carried out according to rule-Ali measures and test records to be handed over to chief officer in three copies.

15) Deck covering

(1)The defective wooden deck on bridge deck to be renewed partly with pine wood planks about 200 m in total (60 mm thickness,125 mm breadth). The new wooden decks to be caulked with rubber. The steel deck plate to be chipped to bare metal and applied with two coats of bitumastic solution (supplied by owner). About 600 m other caulking seams of asphalt and oakum on bridge deck(except above mentioned renewals)to be removed and recaulked with rubber.

(2) The cracked or dented deck composition on boat deck to be renewed about 20 m^2 (25 mm in thickness).

(3) The broken floor tiles about 5 m^2 in galley and W.C. to be renewed.

(4) The broken plastic tiles in crew's cabins, mess room and alleyway to be renewed about 30 m^2 in total.

(Quote separate price for each item.)

16) CO_2 fire extinguishing system

(1) 120 CO_2 bottles to be checked for liquid level and certificates to be issued,3 empty bottles 45 kg type) to be recharged.

(2) Smoke detecting pipe lines to be cleaned and leakage tested by air-blowing. Smoke test

to be carried out.

(3) Smoke detectors to be examined and repaired if necessary.

17) Life boat and davit

(1) Life boat No.2 (fiberglass boat, 65 persons) to be removed. One broken hole (size 50×150 mm) at bow to be repaired

(2) All sheaves and rollers of life boat davit to be overhauled, cleaned, greased and reassembled.

(3) All brake linings and bands of life boat winch to be renewed.

18) Life raft

Two sets of 12 people's inflatable life rafts to be removed to service station, opened up, inspected, equipment renewed as found necessary, repacked and replaced in position. Certificate of inspective to be delivered to chief officer in triplicate.

19) Piping work

(1) Deck fire pipe (Dia. 80 mm, gal. steel pipe) at port side to be renewed partly about 20 m in length.

(2) Corroded compressed air pipe for typhoon along mast to be renewed partly about 5 m in length (Dia. 32 mm).

(3) Deck compressed air pipe for domestic use to be partly renewed (Dia. 25 mm, 10 m length).

(4) Scupper pipes at port and stb'd of first mast house to be renewed (Dia. 80 mm, 10 m length in total with 2 bends).

(5) One chocked bilge sounding pipe in hold No.2 to be made free.

20) Provisions refrigerating chamber.

All "P" rubber packing of doors of meat, fish, fruit, vegetable chambers and lobby to be renewed (Dia. 10 mm,800 mm×1 800 mm, total 5 doors).

3. ACCOMMODATION WORK

1) One section of fresh water pipe(Dia. 25 mm×4 m)and one stop valve(Dia. 25 mm)in crew's bathroom to be renewed.

2) The clogged scupper pipe (Dia. 40 mm) in chief officer's bath mom to be freed up.

3) The broken toilet bowl in captain's bath room to be renewed.

4) Three toilet mirrors(size 300×400 mm)in crew's bath room to be renewed.

5) Three pcs. of side scuttle glass in crew's cabins to be renewed (Dia. 313 mm, thickness 9 mm, toughened glass).

6) Two pcs. of window glass in wheel house to be renewed (6 mm×866 mm×586 mm, toughened glass).

7) One wooden sliding door in way of wheel house stb'd to be renewed (size 800×2 000 mm).

CHAPTER 2 DOCKING ENGINEERING (坞修工程)

PART 1 Sentences(维修用语)

Exercise 1 Talking about the repair list(关于维修单)

1. Good morning/afternoon, sir. Would you please show me where the ship's office is?
早上/下午好! 先生。您能告诉我船上的会议室在什么地方吗?
2. Very nice to meet you, Mr. superintend. I'm the docking fitter supervisor. Could you tell me some repair work about the docking fitter part? Such as propeller, shafting, rudder system, anchor chains, sea bottom valve and over board valve, etc.
很高兴见到您,机务主管先生。我是负责这条船的坞修主管,您能给我介绍一下这条船的坞修修理工程吗? 比如螺旋桨、轴系、舵系、锚链、海底阀和舷外阀等。
3. The propeller should be dismantled and hung up with help of the chain blocks or winch. Propeller and propeller cap should be polished, and check the propeller blade by dye penetration. If there are some deformities of the propeller blade, we want it to be repaired as well.
首先,要将螺旋桨拆卸下来,用葫芦或者卷扬机吊起,螺旋桨及其将军帽要抛光,并且着色探伤。如果桨叶有变形的话,我们也要修理。
4. The intermediate shaft should be dismantled and hung up, the tail shaft should be dismantled and withdrawn into the E/R. The tail shaft taper should be checked by the magnetic particle test and the fore and aft seals should be renewed. The fore and aft liners should be checked and measured, the outside surface should be machined if necessary.
中间轴要拆掉、吊起;尾轴抽进机舱;尾轴梢头要进行磁粉探伤;首尾密封要换新;如有必要,首尾不锈钢套要检查测量;不锈钢套外圆要光车。
5. The anchors and anchor chains should be lowered down and ranged on the deck of dry/floating dock. Measured the diameter of each length, cleaned by means of the high pressure water, marked by the red and white paint and stainless steel wire.
锚和锚链要卸下并在干/浮坞甲板摆放,测量每一节锚链直径,高压水冲洗,用红、白油漆和白钢链条作标记。
6. The upper and lower rudder pintle clearance should be measured and recorded. The rudder jumper clearance also should be measured and record. The inspection hole should be opened and the pintle nut should be checked. The packing cover should be dismounted and the packing should be checked. Before you start the job, please inform the chief engineer. He would like to go together with you for inspection in situs.

舵的上下舵栓间隙及跳动量需要测量一下并作记录;观察孔打开,检查一下舵销螺母;打开盘根压盖,检查一下盘根。当做这些工作时,请通知我们的轮机长现场看一下。

7. All the sea bottom valves and overboard valves should be opened, checked, cleaned and sealing surface ground. All the packing and gaskets should be renewed. The red paint should be coated on the inner surface of the valve body. All the bolts and nuts should be renewed also. The butterfly valve should be cleaned from the outside. Before you refit the valves, please inform the chief engineer as he want to check one by one. After meeting, the chief engineer will show you or your foreman the valves position.
所有的海底阀和舷外阀要打开、清洗、检查、研磨。所有盘根和密封垫要换新。阀体内部涂红油漆。所有螺栓和螺母要换新。蝶阀从舷外清洁。回装之前,请通知我们的轮机长挨个检查。会后,轮机长将阀的位置指给你或是你们的领班。
8. 12 pcs. bottom plugs should be opened after dry docking. When all the water drained off, the bottom plugs and seats should be checked one by one. If there is something wrong about that, renew the plug or the seat. When you open and close the bottom plug, inform our chief mate together with your worker to do that job.
进坞后,要打开 12 只海底塞。水放光以后,海底塞和座要逐个检查,如果有问题,就换新。开、关海底塞时,要找大副一起作业。

Exercise 2 Talking about the chains(关于锚链)

1. Hello, chief mate. Can you start the windlass and lower down the both anchor chains now?
您好! 大副,现在可以起动锚机吗? 我想把锚链给放下去。
2. Hello, captain. I want to know the original diameter of the anchor cable.
您好! 船长,我想知道一下锚链的原始直径。
3. Excuse me, chief mate. How many links about port and starboard anchor chain cables respectively?
大副,左右舷锚链各是多少节?
4. Hello, chief officer. I'm sorry to trouble you. I want to know when shall we mark the anchor chains. Who will supply the paint?
您好! 大副,我想问一下,当锚链要做标记时,谁来提供油漆?
5. Chief mate, this is the record of the anchor chain cable diameter. Please review it.
大副,这是锚链直径的数据记录,您过目一下。
6. Excuse me, chief mate. The superintend checked the anchor cable diameter reading and wanted to change the bitter ends. He wants to replace one end to the other. Now, can you start the windlass? I want to dismantle the both bitter end and lower down on the deck of the dry/floating dock.
大副,机务主管看了一下锚链的直径测量数据,想掉一下头,将第一节调到最后做锚根。现在能起动锚机吗? 我想把两舷的锚根拆下来放到坞底。
7. Hello, chief mate. I checked all the anchor cables and found that some links loosed. How to repair? By welding or other method?

大副,您好! 我检查了一下锚链,发现有些链节横档松动了,怎么处理呢? 是焊一下还是采取别的措施?

8. The anchor should be chipped and painted black.
锚头需要除锈,并涂黑油漆。

9. We measured all the anchor chains and found some links' size are outside of the max. acceptable limit.
我们测量了全部的锚链,发现有几节已经超过最大极限了。

10. Hello, superintend. I want to know who will supply the renewed chains you required, the yard or the ship?
您好! 机务主管,您提出来要换新的锚链是由厂方提供,还是船方提供?

11. Hello, chief officer. Where are the spare parts of the transfer group on board?
您好! 大副,船上的转换组备件在什么地方?

12. Chief officer, if we can not unlock the chain shackles for reversion, what shall we do?
大副,如果要掉头的锚链卸扣打不开,采取什么措施?

13. Chief officer, is there any other repair work? If there isn't, shall we draw the chains in?
大副,锚链舱还有其他工程吗? 如果没有的话,我们把锚链收一下,好吗?

14. Chief officer, some lead sealings of chain lockers are found missing. Would you come and check it?
大副,有几个锚链卸扣的铅封没有了,您是否过去看一下?

15. Chief officer, has the windlass been repaired over? I want to draw the chain.
大副,锚机现在修好了吗? 我想收一下锚链。

16. Chief officer, the pin of anchor is loose, do you want it to be renewed?
大副,锚头的销子有些松动,是否需要换新?

Exercise 3 Talking about the propeller(关于螺旋桨)

1. Hello, chief engineer. I want to see the drawings of the propeller.
你好! 轮机长,我想看一下螺旋桨的图纸。

2. Hello, second engineer. Please drain off the stern tube oil before we dismantle the propeller.
你好! 大管轮,请在我们拆螺旋桨之前,放掉尾轴管油。

3. Chief engineer, I want to take the wear down gauge for measuring the tail shaft wear down before we dismantle the propeller. At that time, could you go together with us?
轮机长,我想在拆桨之前测一下尾轴下沉量,现在我取一下下沉量表。到那时,我来叫你去看一下好吗?

4. Chief engineer, what is the propeller's weight? And what is the diameter?
轮机长,螺旋桨有多重? 它的直径是多少?

5. Chief engineer, we are going to do the dye-penetration test of the propeller, would you go for inspection?
轮机长,现在我们要进行螺旋桨着色探伤,你过去看一下好吗?

6. Chief engineer, we are going to dismantle the propeller, would you go for inspection?

轮机长,现在我们要拆螺旋桨,您是否过去看一下?

7. Mr. superintend, The tail shaft liners have been taken into the shop. It is under dismantling and cleaning now. Would you or chief engineer goes for inspection? Our technicians are measuring the liner. If necessary, it should be machined.
机务主管,现在尾轴套已经运到车间里了,正在解体、清洁,您还是轮机长过去看一下,我们的工艺员正在量不锈钢套的尺寸,如果有必要的话,上床光车。

8. Chief engineer, where are spare parts of the forward and aftward seals.
轮机长,首尾密封的备件在什么地方?

9. Mr. superintend, there are some deformations on the propeller blades. Can we rectify them and take a static balance test for the propeller?
机务主管先生,螺旋桨的桨叶有点变形,是否予以矫正,做一下静平衡试验?

10. Mr. superintend, we have finished the clean work of the propeller surface. Would you go for a check?
机务主管先生,螺旋桨表面的清洁工作已经作完了,您过去验收一下好吗?

11. Chief engineer, the protecting cover of tail shaft has been dismantled. We will measure the tail shaft's wear down, would you go for inspection?
轮机长,现在尾轴的防护罩已经拆下来了,我们要测下沉量,您是否去看一下?

12. Chief engineer, we are going to fix the propeller, would you go to measure the pull up length?
轮机长,现在我们要装复螺旋桨,你是否去看一下其压入量?

13. Mr. superintend, which side will supply the renewed glycerine in propeller cone, shipyard or ship owner?
机务主管先生,螺旋桨将军帽内的换新甘油谁来提供,厂方还是船方?

14. Mr. superintend, we have done the cleaning and inspecting works, there are too many gas porosity in the aftward liner. It could not be used any longer. It should be renewed.
机务主管先生,经过我们清洁检查,尾不锈钢套上沙眼太多,已经不能用了,需要换新。

15. Chief engineer, the propeller has been fixed up according to the manual, and the aftward liner and seals have also been mounted and you can fill oil in. If every thing is normal, we will fill oil to the aftward seals and fix the protecting cover.
轮机长,现在螺旋桨已经按照说明书的要求装复到位了,尾不锈钢套和尾密封也固定好了,您可以往尾轴加油了,如果一切正常的话,我要往尾密封加油,装复尾轴防护罩。

16. Chief engineer, please give a signal when you use the turning gear to repair the main engine. Our workers are polishing the propeller.
轮机长,当您用盘车机修理主机时,请先示一下信号,我们的工人在进行螺旋桨抛光作业。

17. Chief officer, would you please turn the rudder? We are going to dismantle the propeller cone.

大副,您现在可以转一下舵角吗?我们要拆螺旋桨将军帽。

18. Mr. superintend, the propeller cap was broken. What kind of material would you suggest for the renewed one?
机务主管先生,螺旋桨将军帽碎了,您看新换将军帽需要什么材质?

19. Mr. superintend, the propeller NDT test has finished. Would you go for inspection?
机务主管先生,螺旋桨探伤已经结束了,您过去看一下吗?

20. The repaired propeller shall be statically balanced.
修理后的螺旋桨应进行静平衡。

Exercise 4 Talking about the shafting(关于轴系)

1. Chief engineer, could you show me the shafting drawing?
轮机长,给我看一下轴系的图纸,好吗?

2. Mr. superintend, do you think the intermediate shaft bearings need to be opened and checked?
机务主管先生,中间轴承需要打开检查吗?

3. Chief engineer, now we need some spare parts for tail shaft and intermediate shaft, can you send some staffs to cooperate with us?
轮机长,现在我们需要一些尾轴和中间轴的附件,您能派船方人员配合一下吗?

4. Chief engineer, can you clean to sewage under the tail shaft? We might weld caps when withdraw the bolts of the stern shaft. It is not permitted to weld above sewage.
轮机长,您能清洁一下尾轴下面的污油水吗?拔尾轴螺栓可能要焊帽。动电焊时下面有污油水是不允许的。

5. Chief engineer, can you inform the electrician to dismantle the wires of intermediate shaft bearings and oil temperature detectors?
轮机长,您能通知电机员将中间轴承及油温探测器的电线拆掉吗?

6. Mr. superintend, do you want to perform magnetic particle testing on tail shaft taper?
机务主管先生,尾轴的梢头需要磁粉探伤吗?

7. Mr. superintend, we have dismantle the forward sealing and it's under dismantling and cleaning right now. Do you think the stainless steel liner need to be machined?
机务主管先生,首密封我们已经拆下来了,正在解体、清洁,您看一下首不锈钢套是否需要光车?

8. Mr. superintend, all connecting bolts have been drawn out. Some bolts' surfaces have certain damages, do you think it is necessary to have them ground?
机务主管先生,所有连接螺栓已经全部拔出来了,不过有几条螺栓接触表面有点损伤,您看是否需要研磨修复一下?

9. Chief engineer, the fore and aft seals have been wholly renewed and installed. You can test through filling oil into stern tube to see if there is any leakage.
轮机长,现在首尾密封已经全部换新装复了,您可以往尾轴管注油试验一下是否有漏泄。

10. Mr. superintend, now the bush of the intermediate bearings has been opened. The con-

dition is not very well. Do you think it is necessary to have it ground?
机务主管,现在中间轴承瓦已经打开了,状况不是很理想,您看是否需要研磨一下?

11. Chief engineer, some pipes and floor frames will affect our work when we lift the intermediate shaft. We will dismantle them all.
轮机长,如果起中间轴的话,有些管系和地板架影响工作,我们要将它们全部拆掉。

12. It is very difficult to draw the connecting bolts, because it is the first time to draw them. We need the hydraulic jack and driving screw to draw them out, but this may damage the bolts and the holes.
连接螺栓是第一次往外拔,困难相当大,需要用液压油顶和丝杆给拽出来。不过,可能对螺栓及螺栓孔有所损伤。

13. Chief engineer, the stern tube and tail shaft have been cleaned. We will install the tail shaft and intermediate shaft. Would you go there for inspection?
轮机长,现在尾轴管和尾轴都清洗结束了,我们要安装尾轴和中间轴。您是否过去看一下?

14. Chief engineer, the tail shaft and intermediate shaft have been fixed to the position. We will install the accessories. Can you or other engine staff go there for inspection?
轮机长,现在尾轴和中间轴已经装复到位了,我们恢复附件,您或者是其他轮机员是否过去监督一下?

15. Chief engineer, can we use turning gear now?
轮机长,盘车机现在能用吗?

16. Chief engineer, the forward seal has been fixed well, but the oil orifice connector is not the same size as the original one. It is necessary to make a new one.
轮机长,现在首密封已经装好了,不过注油孔跟原来密封注油孔接头不一样,需要重做新的接头。

17. Chief engineer, should the stern tube oil be supplied by oil pump or by gravity tank?
轮机长,尾轴管加油是通过油泵还是重力油柜?

18. Mr. superintend, do the surfaces of the connecting bolts have to be nondestructive tested?
机务主管先生,连接螺栓的接触面还需要探伤吗?

19. Mr. superintend, a connecting bolts can not be drawn out at all. The only way is to cut it off and make a new one.
机务主管先生,有条连接螺栓根本拔不动,现在惟一的办法就是将其割掉,再做一条新的。

Exercise 5 Talking about the rudder(关于舵)

1. Chief officer, could you show me the rudder's drawing?
大副,能给我出示一下舵系的图纸吗?

2. Mr. superintend, can you tell me the diameters of the rudder stock and rudder pintle?
机务主管,您能告诉我舵杆和舵销的直径是多少吗?

3. Chief engineer, we will measure the clearances of upper and lower rudder pintle. Could

you go there for inspection?
轮机长,现在我们要测量上下舵销间隙,您是否去看一下?

4. Mr. superintend, the clearances of upper and lower rudder pins exceed the acceptable tolerance according to our measurement. Do you think it is necessary to renew them?
机务主管先生,根据我们测量的数据看,上下舵销间隙均已超差,您看是否要换新?

5. Mr. superintend, should the taper of the rudder stock be taken the magnetic particle test?
机务主管先生,舵杆梢头是否需要磁粉探伤?

6. Mr. superintend, shall we check the alignment of the rudder stock and rudder blade by using piano wire?
机务主管先生,舵杆和舵叶需要拉线试验吗?

7. Mr. superintend, there was water flowing out when we open the rudder bottom seal lock just now. Maybe there is crack on the rudder blade. Is it necessary to take a vacuum test?
机务主管先生,刚才舵底塞打开检查,发现有水流出,舵叶可能有裂纹,是否需要进行真空试验?

8. Mr. superintend, is it necessary to replace the packing of the rudder lever?
机务主管先生,舵杆盘根需要换新吗?

9. Mr. superintend, the rudder stock and taper have been rusted by sea water. Is it necessary to machine them?
机务主管先生,舵杆和梢头已经被海水有所腐蚀,是否需要光车处理?

10. Chief engineer, could you look up the weights of the rudder blade and rudder lever for me?
轮机长,您能给我查一下舵叶及舵杆的重量是多少吗?

11. Mr. superintend, we are going to do pressure test to the rudder blade. Does anyone from the ship will go there for inspection?
机务主管先生,现在我们要进行舵叶泵压测试,船方是否去看一下?

12. Mr. superintend, what's the material of the renewed rudder bush, copper or Salem?
机务主管先生,换新舵套的材料是什么,是铜套还是赛龙套?

13. Mr. superintend, is there any spare part of rudder bush onboard? If there isn't, which side should supply it, the ship or the yard?
机务主管先生,船上有舵套的备件吗?如果没有的话,是船方提供还是厂方提供?

14. Mr. superintend, the hole of the lower rudder pintle damaged. It needs to be bored.
机务主管先生,下舵销孔有所损伤,需要镗孔处理。

15. Mr. superintend, we are going to dismantle the rudder lever. First of all, the rudder tiller and hydraulic accessories should be removed. Could you send some shipping staff to cooperate with us?
机务主管先生,现在我们要将舵杆拆下来,首先要拆掉舵柄及液压附件,您能派船方人员配合一下吗?

16. Mr. superintend, the material of the rudder bush on board is made of copper. Maybe it is difficulty to renew the bush with the same material considering the time limit. What

do you think if we supply the Salem bush?

机务主管先生,现在舵套的材料是铜的,而您提出需要换同样材料的销套,如果考虑工期的话,恐怕时间上不允许。我们可以为船方提供赛龙套,您看如何?

17. Mr. superintend, the doors of rudder blade have been wholly opened. We can go to measure the clearances of the rudder pins.

机务主管先生,现在舵叶工艺孔道门已全部打开,我们可以去测量舵销间隙了。

18. Mr. superintend, our workers have opened the doors of rudder blade. We can check the fitting screw caps of the rudder pintles now.

机务主管先生,现在我们的工人已经将舵叶道门打开了,我们可以去检查舵销锁紧螺帽了。

19. Chief officer, the rudder bottom seal lock has been closed. Shall we seal it up by cement or by welding?

大副,现在舵底塞已经关上了,您看是搪水泥还是焊盲板?

20. Mr. superintend, our technician has measured the size of rudder stock, rudder pins, pin holes and pin bushes. This is the measurement report. Would you go there for inspection?

机务主管先生,我们工艺员已经将舵杆、舵销及销孔、销套尺寸全部量完了。这是数据报告,您是否需要去检查一下?

21. Mr. superintend, we are going to install a new bush. Would you go there for inspection?

机务主管先生,现在我们要装新套,您是否过去看一下?

22. The clearance between upper key and key slot of rudder tiller is slightly larger than permitting.

舵柄上键和键槽的间隙有点偏大。

23. Chief engineer, could you tell me where is the special tools of dismantling the rudder tiller.

轮机长,能告诉我压舵柄的专用工具在什么地方吗?

24. Chief officer, could the fixing screw caps of rudder pin be lifted by the crane?

大副,能用船上的克令吊给我吊运一下舵销的锁紧螺帽吗?

25. Mr. superintend, the scatch on the thrust pad is a little deep. It should be machined.

机务主管先生,推力片上拉痕比较深,需要上床光车。

26. Chief officer, the rudder has already been installed. You may run the steering gears to test it.

大副,现在舵已经安装完毕,您开舵机试一下好用与否。

Exercise 6 Talking about the valve(关于阀)

1. Chief engineer, how many sea valves and over board valves should be repaired?

轮机长,有多少个海底阀和舷外阀需要修理?

2. Chief engineer, could you send a engineer officer to show me the positions of the valves that should be repaired?

轮机长,您能安排轮机员给我指一下需要修理的阀的位置吗?

3. Chief engineer, where is the emergency sea water pump, in forepeak or in the steering gear compartment?
轮机长,应急消防泵海水吸入阀在首尖舱还是舵机间?

4. Chief engineer, bolts of the sea suction valves have been seriously rusted. They need to be cut off by cutting torch.
轮机长,海底吸入阀螺栓已经锈蚀严重了,需要用气割割掉换新。

5. Chief engineer, would you please show me the detail repair list about sea valves and over board valves including their sizes, types, positions and functions.
轮机长,您能给我提供一份完整的关于海底阀和舷外阀的修理单吗?包括尺寸、类型、位置及功能等。

6. Mr. superintend, does sea chest need to be tested with pressure?
机务主管先生,海底阀箱需要泵压试验吗?

7. Mr. superintend, do sea valves and over board valves need to be pressure tested?
机务主管先生,海底阀及舷外阀需要泵压吗?

8. Mr. superintend, all sea valves and over board valves have been cleaned, ground over. When will you go and check them?
机务主管先生,所有海底阀及舷外阀已经清洗、研磨好了,您什么时候过去验收一下?

9. Mr. superintend, the work of butterfly valves is cleaning and checking, is that right?
机务主管先生,蝶阀的工程就是清洁、检查一下,对吗?

10. Chief engineer, some valves' discs have been seriously rusted. They need to increase the size and be machined.
轮机长,有些阀头腐蚀严重,需要长肉光车。

11. Chief engineer, some valves can not be used any more and need to be renewed. Which side should supply the spare parts, the ship or the shipyard?
轮机长,有些阀体已经不行了,需要换新,是由船方还是厂方来供备件?

12. Chief engineer, some valves' levers broken and need to be replaced.
轮机长,有些阀杆断裂了,需要换新。

13. Chief engineer, the flange of renewed valve is not the same as the original. It needs to be changed.
轮机长,新换阀与原来阀的法兰不一样,需要更换法兰。

14. Chief engineer, all valve projects have been finished. Would you go for inspection? We are going to install them.
轮机长,现在所有阀工程已经结束,您过去验收一下,我们要回装。

15. Mr. superintend, do you have any requirement on the certificates of the renewed valves?
机务主管先生,您对换新阀门有没有证书的要求?

16. Chief engineer, some butterfly type valves' worms and worm wheels clearance exceeded the limits. Is it necessary to make a new pair?
轮机长,有些蝶阀的蜗轮蜗杆机构有些滑尺,是否需要做一套新的?

17. Mr. superintend, the valves ordered as your required might not arrive before the ship leaving. Is it necessary to chance the valves with other certificates?
机务主管先生,按照您的要求所定购的阀门,估计在船出坞以前难以到厂,是否需要更换其他证书的阀门?
18. Chief engineer, some valves can not be used any more after grinding and checking. They need to be renewed, don't they?
轮机长,有些阀头经过研磨检查,已经不能再使用了,需要新做,您看如何?
19. Chief engineer, higher and lower sea suction valve is upside down type. It is difficult to grind its body. I want to dismantle the upper cover. The worker will grind it from the sea valve case. Do you agree?
轮机长,高低位海底吸入阀是倒挂式的,对本体研磨的难度较大。我想将上部压盖拆一下,然后工人从海底阀箱进行研磨,如何?
20. Chief engineer, a shutter of the storm valve is seriously rusted. It needs to be renewed.
轮机长,有个防浪阀的阀板锈蚀严重,需要新做一个。
21. Chief engineer, the shutter of a valve need to be built-up by welding and machined.
轮机长,有个闸板需要堆焊光车。
22. Chief engineer, please conform the number of sea valves and over board valves that need to be repaired and inform me as soon as possible.
轮机长,请您再确定一下所修海底阀及舷外阀的数量,请及早通知我。

Exercise 7 Talking about the coating(关于涂装)

1. Nice to meet you! Let me introduce myself, my name is ××, I'm the painting supervisor.
您好!让我自我介绍一下,我叫××,我是涂装工程主管。
2. I'm in charge of the painting work including blasting, chipping and painting.
我负责所有涂装工程,包括喷砂、敲铲、涂装。
3. I'd like to do my best to achieve your requirement.
我愿意为您提供满意的服务。
4. I want to discuss the cargo hold painting work with you.
我想同您讨论一下货舱涂装工程。
5. First of all let's check the cargo hold.
首先,让我们共同勘验一下货舱。
6. I think the cargo holds are seriously rusted.
我认为您船货舱锈蚀严重。
7. I suggest that this cargo hold should be blasted to SA 2.0.
我建议这个货舱全部喷砂 SA 2.0 级。
8. How many percentage of the fore & aft lower stool to be blasted to SA 2.0?
您认为前后下壁堆喷砂 SA 2.0 级的比例为多少?
9. I don't agree with you, I think the blasting percentage should be more.
我不同意您的说法,我认为喷砂比例还要高一些。

10. The fore and aft corrugated bulkhead can be spot blasted to SA 2.0.
前后槽型舱壁可以点喷砂 SA 2.0 级。
11. Port and starboard side upper hopper, fore and aft center deck can be spot blasted to SA 2.0.
左右上斜坡、前后连接甲板可以点喷砂 SA 2.0 级。
12. Port and starboard side frame and bulkhead should be full blasted to SA 2.0.
左右肋骨及舱壁应该全部喷砂 SA 2.0 级。
13. I hope that you can give a reasonable blasting percentage.
我希望您给出合理的喷砂比例。
14. We have the same opinion about this cargo hold blasting.
有关这个货舱喷砂工程双方意见一致。
15. Please let me know how to do the painting work in the T.S.T.
请问顶边舱涂装工程如何做?
16. Do you agree with chipping? After chipping, shall we grind?
您同意点锈敲铲吗?敲铲完工后,需不需要打磨?
17. Good quality couldn't be achieved by chipping, blasting is the better way.
敲铲不能获得最好质量,较好的方法是喷砂除锈。
18. The price of blasting in closed tank is different from the one in the common cargo hold.
封闭舱室喷砂工程价格不同于普通货舱工程。
19. For closed tank, ventilation should be performed before painting.
封闭舱室涂装前必须进行通风。
20. We'll follow your requirement.
我们将照您的吩咐去做。
21. We'll do our best to achieve your requirement on the painting work.
我们一定把涂装工作做好,达到您满意。
22. I think the blasting have come up to world advanced standard.
我认为这次喷砂施工已经达到世界先进标准。
23. We must know the surface area and the quantity of paint before painting.
涂装前要知道涂装面积和涂料用量。
24. The wet comb should be used constantly to check the wet film thickness in the course of painting in order to make sure that the thickness is even.
涂装过程中要经常用湿膜测厚仪检查湿膜厚度,确保涂层均匀。
25. Paint should be mixed well with a mixer before painting.
涂料使用前要用搅拌器进行充分搅拌。
26. Normally 5% of the thinner is enough, don't add any more.
不要加入过多的稀释剂。一般加入量不得超过 5%。
27. Painting application conditions should be like this: relative humidity should be less than 85%, steel temperature should be 3 ℃ above the dew point.
涂装施工条件规定相对湿度应在 85% 以下,钢材表面温度应高于周围空气的露点

3 ℃。

28. After painting application we should check for defects such as holiday areas, sag and running and the touch up should be done in time.
喷漆完工后,应检查有无漏涂、流挂等缺陷,及时修补。

29. We can't guarantee the edge of the blasting spot is smoothly feathered if spot blasting.
若点喷砂除锈,我们不能保证喷砂点的边缘成光滑斜面。

30. Your request is not reasonable, please think about it again.
您的要求有点不合理,希望您再重新考虑一下。

31. We can't guarantee all of the rust and old paint will be removed if you decide to do sweep blasting SA 1.0.
如果您决定扫砂 SA 1.0,我们不能保证去除所有的锈蚀和旧油漆。

32. I think the blasting already achieved the blasting standard you specified.
我认为喷砂已经达到您确定的喷砂标准等级。

33. Although it's cloudy, but the RH is low, so there is nothing wrong with the paint application.
今天虽然阴天,但是相对湿度小,不影响喷漆施工。

34. It's a good day, I hope that we can do two coats today.
今天天气很好,希望一天能涂两度油漆。

35. Now it's the rainy season so the RH is a little higher, please consider it.
这个季节是多雨的季节,相对湿度偏高一点,请您考虑。

36. We use airless spraying equipments and all of the workers are experienced for many years.
我们采用无气喷漆设备,工人都具有多年经验。

37. I hope we can do another coat tonight, the lighting is no problem.
希望今天晚间能再喷一度漆,灯光没有问题。

38. Who is going to inspect the chipping in the ballast tanks of the double bottom?
谁来检查双层底压载舱敲铲工程?

39. We need to scaffold in the chain locker for chipping, do you agree?
锚链舱敲铲工程需要搭设脚手架,您同意吗?

40. Do you think we shall wash the chain locker by high pressure water?
锚链舱需要冲高压淡水吗?

41. Who is going to supply the paint for the chain locker? Who is going to supply the cathodic anodes for the aft of the ship?
谁来提供锚链舱用油漆?谁来提供船尾用阳极块?

42. How many kilograms does one anode weigh? Is it welded or bolted?
您需要的阳极块为多少公斤一块?是焊接型还是螺栓型?

43. Can you give me the anode arrangement drawing?
可以提供一张阳极块布置图吗?

44. Can I borrow your midship section drawing and general arrangement drawing?

可以借一下船中剖面图及总布置图吗?

45. We have to calculate the tank surface area you gave to us.
您给定的舱面积我们需要核算一下。

46. This is my calculation, please check it.
这是我们计算的结果,请您查对一下。

47. I estimate that we will finish the blasting of all the cargo holds in five days.
估计全部货舱喷砂工程需要五天完成。

48. These are the finished forms of all the works, please check and sign.
这是全部工程完工单,请您审查签字。

49. The surface of the engine room should be chemical cleaned to remove oil and then spray one coat of alkyd enamel.
机舱表面化学清洁除油,喷涂一度白醇酸磁漆。

50. New steel plates must be shot blasted and then sprayed with one coat of inorganic zinc shop primer.
新钢板必须进行抛丸除锈,喷涂一度无机锌车间底漆。

51. Spot blast to SA 2.0 on topside and then spray two coats of epoxy primer and one polyurethane topcoat.
干舷点喷砂除锈 SA 2.0 级,喷涂两度环氧底漆和一度聚氨脂面漆。

52. Full blast to SA 2.0 on boottopping and then spray three coats of epoxy paint.
水线间全部喷砂至 SA 2.0 级,涂三度环氧漆。

53. Spot blast to SA 2.0 on vertical side and then spray three coats of epoxy primer and two coats of SPC.
直底点喷砂除锈 SA 2.0 级,喷涂三度环氧底漆和两度 SPC 自抛光防污漆。

54. Repaint all the marks.
所有船舶标志重描。

55. Clean and chip the rust and sea lives in the sea chests and spray the same coats as the vertical side.
海底阀箱内面清洁,刮铲海生物和锈蚀,喷漆同直底一样。

56. Full sweep blast on flat bottom and then spray two coats of epoxy primer and two coats of SPC.
平底全部轻扫砂,全喷两度环氧底漆和两度 SPC 自抛光防污漆。

57. High pressure water washing and chipping the ballast tanks and then spray two coats of coal tar epoxy.
压载水舱冲高压水清洁,敲铲除锈,喷涂两度环氧沥青漆。

58. Clean the oil, water and dust on the main deck by high pressure water washing and chipping , and then spray two coats of epoxy anti abrasion paint.
甲板清除所有的油污、水及灰土,高压淡水冲洗,敲铲除锈,喷涂两度环氧耐磨漆。

PART 2 Reading materials(阅读材料)

Text 1 Introduction to transmission system

The transmission system on a ship transmits power from the engine to the propeller. It is made up of shafts, bearings, and finally the propeller itself. The thrust from the propeller is transferred to the ship through the transmission system.

The different items in the system include the thrust shaft, one or more intermediate shafts and the tail shaft. These shafts are supported by the thrust block, intermediate bearings and the stern tube bearing. A sealing arrangement is provided at either end of the tail shaft with the propeller and cone completing the arrangement. These parts, their location and purpose are shown in Fig. 2.1.

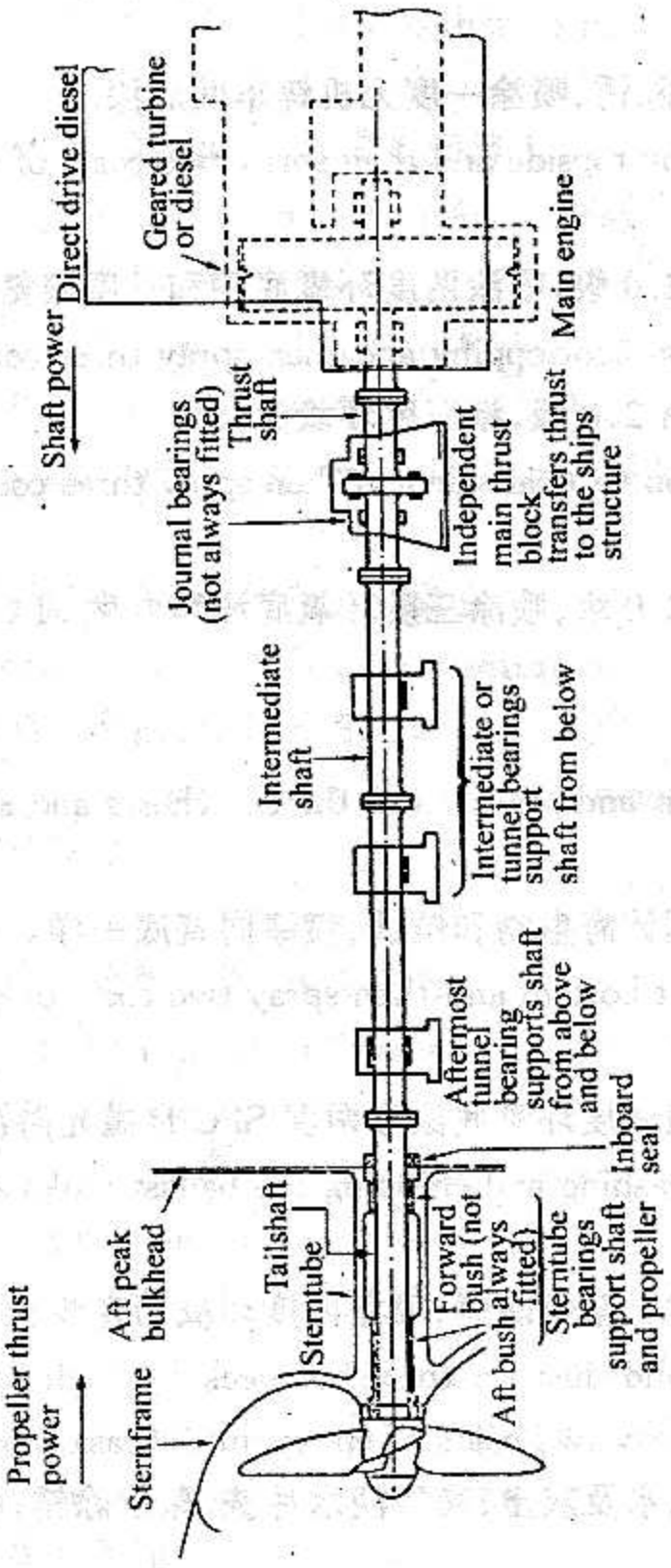


Fig. 2.1 Transmission system

New words and phrase

transmission	*n*.	传动,传送,传输
transmission system		动力传动系统
transmit	*vt*.	转送,传输
propeller	*n*.	推进器,螺旋桨
shaft	*n*.	轴
bearing	*n*.	轴承
thrust	*n*.	推力
transfer	*vt*.	转移,传递
thrust shaft		推力轴
intermediate shaft		中间轴
tail shaft		尾轴
thrust block		止推座,推力轴承
intermediate bearing		中间轴承
stern tube bearing		尾轴承
seal	*n*.; *vt*.	密封
cone	*n*.	圆锥体
part	*n*.	部分,零件

Text 2 Thrust block

The thrust block transfers the thrust from the propeller to tile hull of the ship. It must therefore be solidly constructed and mounted onto a rigid seating or framework to perform its task. It may be an independent unit or an integral part of the main propulsion engine. Both ahead and astern thrusts must be catered for and the construction must be strong enough to withstand normal and shock loads.

The casing of the independent thrust block is in two halves which are joined by fitted bolts (Fig. 2.2). The thrust loading is carried by bearing pads which are arranged to pivot or tilt. The pads are mounted in holders or carriers and faced with white metal. In the arrangement shown the thrust pads extend three quarters of the distance around the collar and transmit all thrust to the lower half of the casing. Other designs employ a complete ring of pads. An oil scraper deflects the oil lifted by the thrust collar and directs it onto the pad stops. From here it cascades over the thrust pads and bearings. The thrust shaft is manufactured with integral flanges for bolting to the engine or gearbox shaft and the intermediate shafting.

Where the thrust shaft is an integral part of the engine, the casing is usually fabricated in a similar manner to the engine bedplate to which it is bolted. Pressurized lubrication from the engine lubricating oil system is provided and most other details of construction are similar to the independent type of thrust block.

New words and phrase

hull	*n*.	外壳,船体
solidly	*adv*.	稳固地

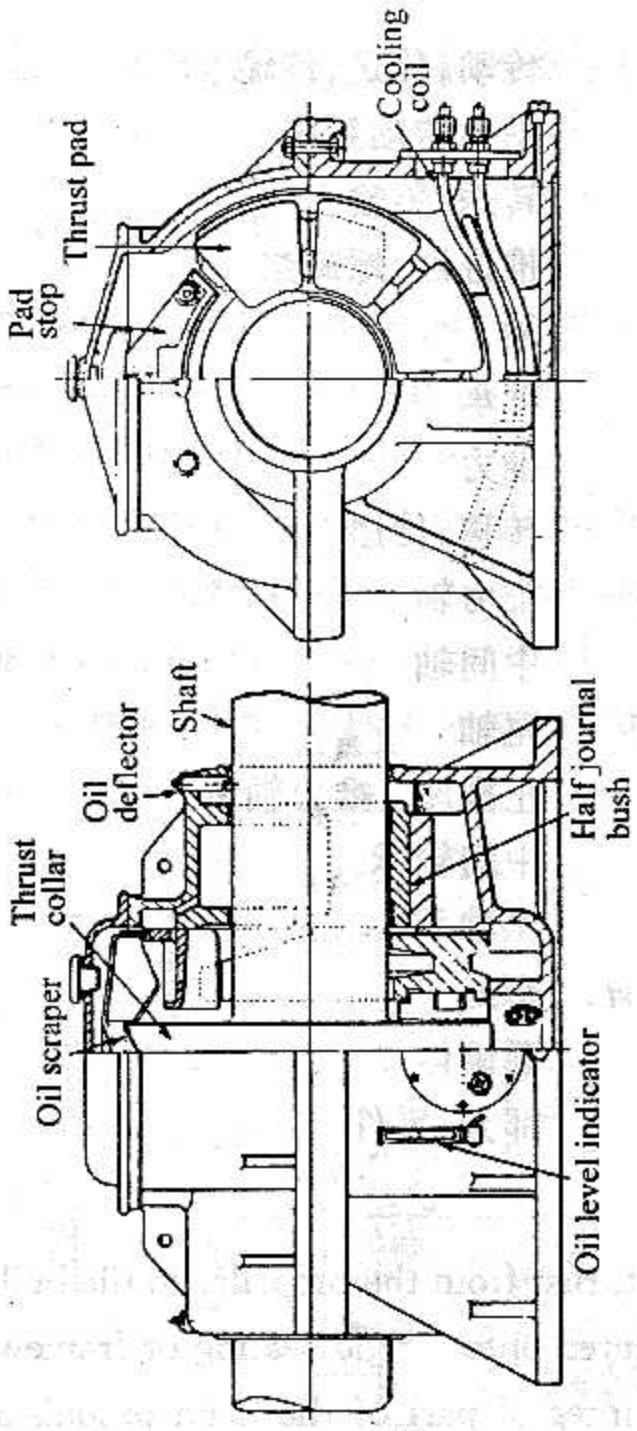


Fig. 2.2 Thrust block

construct	*vt*.	建造,构造
mount	*vt*.	装配,安放
rigid	*adj*.	刚硬的,刚性的,坚固的
seating	*n*.	座,基座
framework	*n*.	框架,结构
perform (task)	*vt*.	完成(任务)
integral	*adj*.	整体的,构成整体所需要的 \ ~ part 组成件,组成部分
cater	*vi*.	(常与 for 连用)满足,提供
normal	*adj*.	垂直的,法向的 ~force 法向力
casing	*n*.	壳体,箱体
bolt	*n*.	螺钉;螺栓
loading	*n*.	载荷
bearing pad		推力块
pivot	*n*.	枢轴,轴颈
tilt	*n*.	倾斜,斜坡,倾斜面

bearing pad

collar	*n*.	环,轴环
oil scraper		刮油器
deflect	*vt*.	(使)转向
pad stop		推力块,止推块
cascade	*vt*., *vi*.	(使)浇注
gearbox	*n*.	变速箱
fabricate	*vt*.	制作,加工
manner	*n*.	样式
engine bedplate		柴油机底座
lubrication	*n*.	润滑油

Text 3 Shaft bearings

Shaft bearings are of two types, the aftermost tunnel bearing and all others. The aftermost tunnel bearing has a top and bottom bearing shell because it must counteract the propeller mass and take a vertical upward thrust at the forward end of the tail shaft. The other shaft bearings only support the shaft weight and thus have only lower half bearing shells.

An intermediate tunnel bearing is shown in Fig. 2.3. The usual journal bush is here replaced by pivoting pads. The tilting pad is better able to carry high overloads and retain a thick oil lubrication film. Lubrication is from a bath in the lower half of the casing, and an oil thrower ring dips into the oil and carries it round the shaft as it rotates. Cooling of the bearing is by water circulating through a tube cooler in the bottom of the casing.

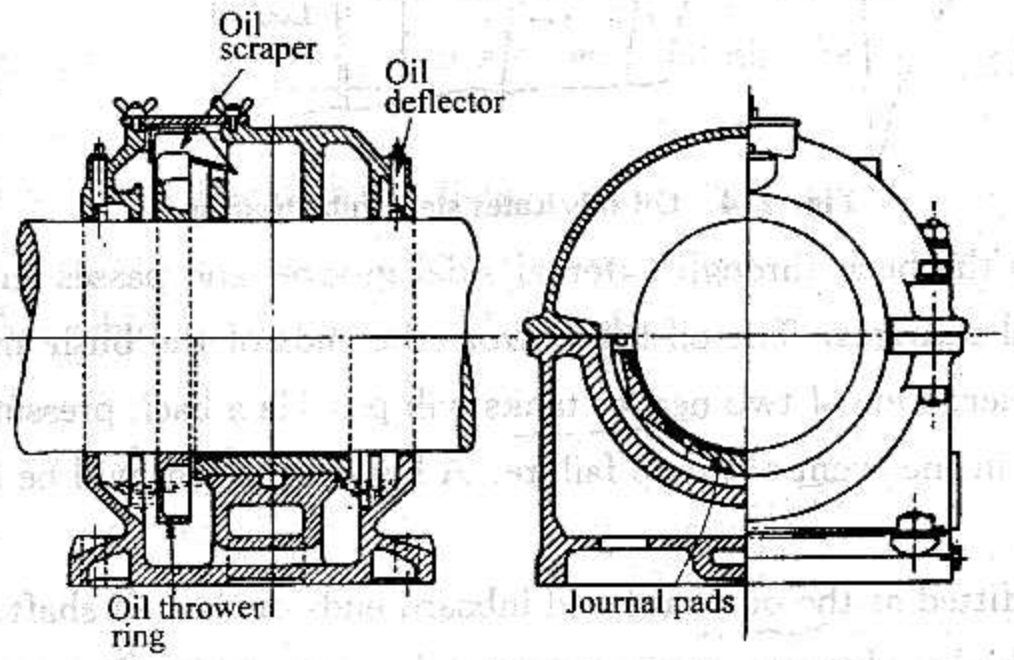


Fig. 2.3 Tunnel bearing

New words and phrase

aftermost	*adj*.	最后的,最后部的,靠船尾的
tunnel	*n*.	隧道,隔(舱)壁
counteract	*vt*.	抵消,中和
mass	*n*.	质量
journal	*n*.	轴颈
bush	*n*.	衬套

retain	*vt*.	保持
oil thrower ring		甩油环
dip	*v*.	浸入
circulate	*v*.	(使)循环
tube	*n*.	管，管子
cooler	*n*.	冷却器

Text 4 Stern tube bearing

The stern tube bearing serves two important purposes. It supports the tail shaft and a considerable proportion of the propeller weight. It also acts as a gland to prevent the entry of sea water to the machinery space.

Early arrangements used bearing materials such as lignum vitae (a very dense form of timber) which were lubricated by sea water. Most modern designs use an oil lubrication arrangement for a white metal lined stern tube bearing. One arrangement is shown in Fig. 2.4.

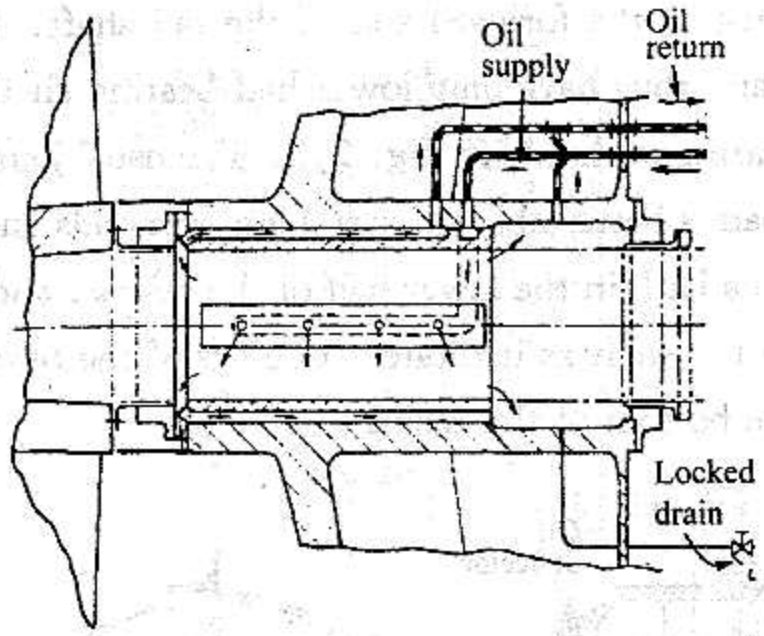


Fig. 2.4 Oil lubricates stern tube bearing

Oil is pumped to the bush through external axial grooves and passes through holes on each side into internal axial passages. The oil leaves from the ends of the bush and circulates back to the pump and the cooler. One of two header tanks will provide a back pressure in the system and a period of oil supply in the event of pump failure. A low-level alarm will be fitted to each header tank.

Special seals are fitted at the outboard and inboard ends of the tail shaft. Oil pressure in the lubrication system is higher than the static sea water head to ensure that sea water cannot enter the stern tube in the event of seal failure.

New words and phrase

stern tube bearing		尾轴管轴承
considerable	*adj*.	相当大(或多)的
proportion	*n*.	比例，部分
gland	*n*.	密封管
lignum vitae		铁犁木
timber	*n*.	木材，木料

white metal		白合金
pump	*n*.	泵；*vt*.(用泵)抽
external	*adj*.	外部的，表面的
axial	*adj*.	轴向的
groove	*n*.	凹槽
internal	*adj*.	内部的
passage	*n*.	通道
header tank		重力柜
back pressure		背压
event	*n*.	事件
failure	*n*.	失效，故障
low-level alarm		低位报警
outboard	*adj*.	向舷外的
inboard	*adj*.	舷内的
water head		水头，水位压力差

Text 5 Shafting

There may be one or more sections of intermediate shafting between the thrust shaft and the tail shaft, depending upon the machinery space location. All shafting is manufactured from solid forged ingot steel with integral flanged couplings. The shafting sections are joined by solid forged steel fitted bolts.

The intermediate shafting has flanges at each end and may be increased in diameter where it is supported by bearings.

The propeller shaft or tail shaft has a flanged face where it joins the intermediate shafting. The other end is tapered to suit a similar taper on the propeller boss. The tapered end will also be threaded to take a nut which holds the propeller in place.

New words and phrase

section	*n*.	部分，部件
solid	*n*.	固体；*adj*. 固体的
forge	*v*.	锻造
ingot	*n*.	块，锭
ingot steel		锭钢
flanged	*adj*.	带凸缘的，用法兰连接的
coupling	*n*.	联结，接合
diameter	*n*.	直径
taper	*adj*.	锥形的；*n*. 锥形，锥度
propeller boss		螺旋桨毂
thread	*n*.	螺丝，螺纹；*vt*. 攻螺纹
nut	*n*.	螺母，螺帽

Text 6 Propeller

The propeller consists of a boss with several blades of helicoidal form attached to it. When rotated it's or thrusts its way through the water by giving momentum to the column of water passing through it. The thrust is transmitted along the shafting to the thrust block and finally to the ship's structure.

A solid fixed pitch propeller is shown in Fig. 2.5. Although usually described as fixed pitch, the pitch does vary with increasing radius from the boss. The pitch at any point is however fixed, and for calculation purposes a mean or average value is used.

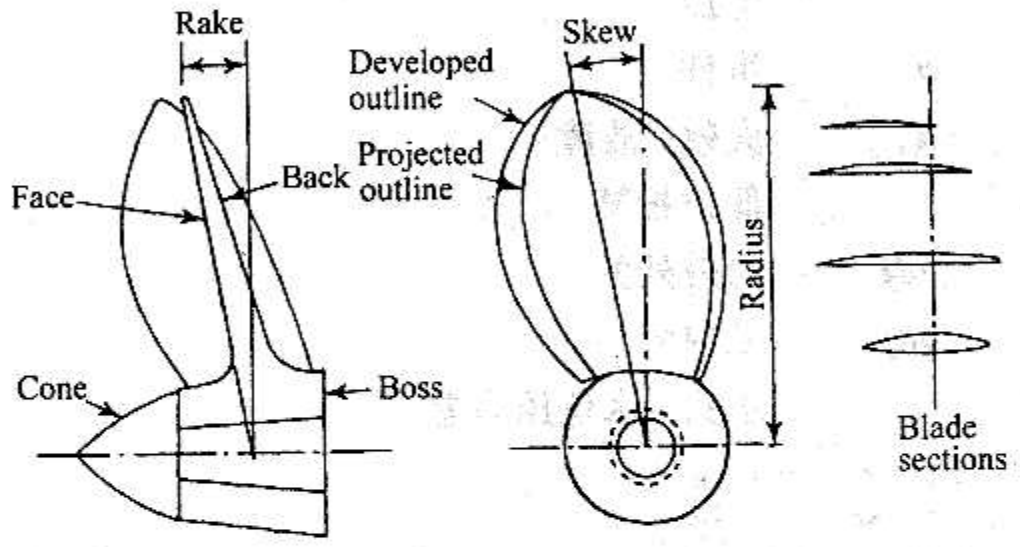


Fig. 2.5 Solid propeller

A propeller which turns clockwise when viewed from aft is considered right handed and most single screw ships have right handed propellers. A twin screw ship will usually have a right handed starboard propeller and a left handed port propeller.

New words and phrase

blade	*n*.	螺旋桨桨叶
helicoidal	*n*.	螺旋面
screw	*vi*.	转动
thrust	*vi*.	推进
momentum	*n*.	动力,动量
pitch	*n*.	螺距
fixed pitch propeller		定螺距桨
radius	*n*.	半径
clockwise	*adj*.	顺时针方向的;*adv*.顺时针方向地
aft	*adj*.; *adv*.	在船尾(的);*n*.船尾部
twin screw ship		双螺旋桨船
starboard	*n*.	右舷
port	*n*.	左舷

Text 7 Propeller mounting

The propeller is fitted onto a taper on the tail shaft and a key may be inserted between the two: alternatively a keyless arrangement may be used. A large nut is fastened and locked in place on tile end of the tail shaft: a cone is then bolted over the end of the tail shaft to provide it smooth

flow of water from the propeller.

One method of keyless propeller fitting is the oil injection system. The propeller bore has a series of axial and circumferential grooves machined into it. High pressure oil is injected between the tapered section of the tail shaft and the propeller. This reduces the friction between the two parts and the propeller is pushed up the shaft taper by a hydraulic jacking ring. Once the propeller is positioned the oil pressure is released and the oil runs back, leaving the shaft and propeller securely fastened together.

New words and phrase

mounting	*n*.	装配
key	*n*.	键
alternatively	*adv*.	作为选择，二者择一地
fasten	*vt*.	拴紧，使固定
propeller cone		螺旋桨轴帽
injection	*n*.	注射
bore	*n*.	孔
circumferential	*adj*.	圆周的
friction	*n*.	摩擦，摩擦力
hydraulic jack		液压千斤顶
securely	*adv*.	可靠地，安全地

Text 8 Controllable pitch propeller

A controllable pitch propeller is made up of a boss with separate blades mounted into it. An internal mechanism enables the blades to be moved simultaneously through an arc to change the pitch angle and therefore the pitch. A typical arrangement is shown in Fig. 2.6.

The control mechanism, which is usually hydraulic, passes through the tail shaft and operation is usually from the bridge. Varying the pitch will vary the thrust provided, and since a zero pitch position exists the engine shaft may turn continuously. The blades may rotate to provide astern thrust and therefore the engine does not require to be reversed.

New words and phrase

controllable pitch propeller		可调螺距桨
boss	*n*.	桨毂
blade	*n*.	桨叶
simultaneously	*adv*.	同时地
pitch angle		螺距角
control mechanism		控制机构
hydraulic	*adj*.	液压的
tail shaft		尾轴
bridge	*n*.	驾驶台
vary	*vt*.	改变
thrust	*n*.	推力

continuously	*adv.*	连续地
astern	*adv.*	在船尾，向船尾
reverse	*vt.*	反转

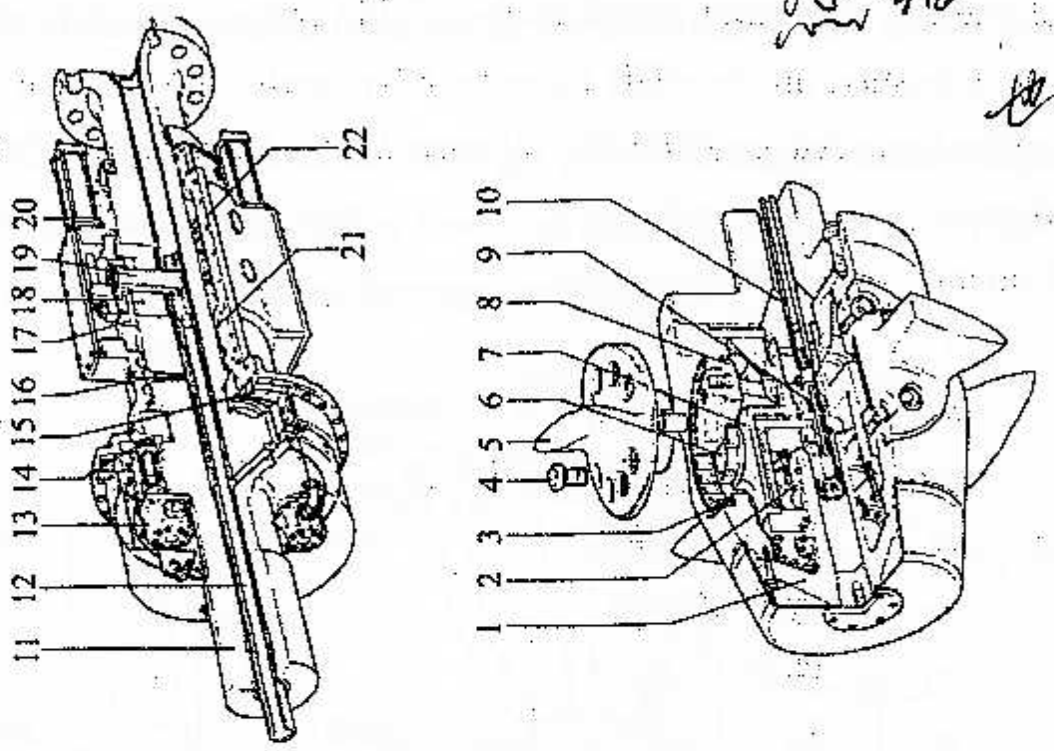


Fig. 2.6 Controllable pitch propeller

1 Piston rod;2 Piston;3 Blade seal;4 Blade bolt;5 Blade;6 Crankpin;
7 Servomotor cylinder;8 Crank ring;9 Control valve;10 Valve rod;
11 Mainshaft;12 Valve rod;13 Main pump;14 Pinion;
15 Internally toothed gear ring;16 Non-return valve;
17 Sliding ring;18 Sliding thrust block;19 Corner pin;
20 Auxiliary servomotor;21 Pressure seal;22 Casing

Text 9 Cavitation

Cavitation, the forming and bursting of vapor filled cavities or bubbles, can occur as a result of pressure variations on the back of a propeller blade. The results are a loss of thrust, erosion of the blade surface, vibrations in the afterbody of the ship and noise. It is usually limited to high speed heavily loaded propellers and is not a problem under normal operating conditions with a well designed propeller.

New words and phrase

cavitation	*n.*	气穴现象
burst	*v.*	爆裂，炸破
cavity	*n.*	洞，空穴
bubble	*n.*	泡沫
variation	*n.*	变化
erosion	*n.*	腐蚀，侵蚀
vibration	*n.*	振动，颤动
noise	*n.*	噪声

Text 10 Propeller maintenance

When a ship is in dry dock the opportunity should be taken to thoroughly examine the pro-

peller, and any repairs necessary should be carried out by skilled dockyard staff.

A careful examination should be made around the blade edges for signs of cracks. Even the smallest of cracks should not be ignored as they act to increase stresses locally and can result in the loss of a blade if the propeller receives a sharp blow. Edge cracks should be welded up with suitable electrodes.

Bent blades, particularly at the tips, should receive attention as soon as possible. Except for slight deformation the application of heat will be required. This must be followed by more general heating in order to stress relieve the area around the repair.

Surface roughness caused by slight pitting can be lightly ground out and the area polished. More serious damage should be made good by welding and subsequent heat treatment. A temporary repair for deep pits or holes could be done with a suitable resin filler.

New words and phrase

dry dock		干船坞
carry out		完成，实现，执行
dockyard staff		船厂修理人员
blade edge		桨叶叶梢
crack	*n*.	裂纹
act	*vi*.	产生……的效果
blow	*n*.	突然的冲击
weld up		焊补
electrode	*n*.	电焊条
general	*adj*.	全面的，均衡的
surface roughness		表面粗糙度
pitting	*n*.	蚀损斑
grind out		磨平
polish	*vt*.	打光
subsequent	*adj*.	然后的
temporary	*adj*.	临时的，临时性的
resin	*n*.	树脂

Text 11 Steering gear

The steering gear provides a movement of the rudder in response to a signal from the bridge. The total system may be considered made up of three parts, control equipment, a power unit and a transmission to the rudder stock. The control equipment conveys a signal of desired rudder angle from the bridge and activates the power unit and transmission system until the desired angle is reached. The power unit provides the force, when required and with immediate effect, to move the rudder to the desired angle. The transmission system, the steering gear, is the means by which the movement of the rudder is accomplished.

Certain requirements must currently be met by a ship's steering system. There must be two independent means of steering, although where two identical power units are provided an auxiliary

unit is not required. The power and torque capability must be such that the rudder can be swung from 35° one side to 35° the other side with the ship at maximum speed, and also the time to swing from 35° one side to 30° the other side must not exceed 28 seconds. The system must be protected from shock loading and have pipework which is exclusive to it as well as be constructed from approved materials. Control of the steering gear must be provided in the steering gear compartment.

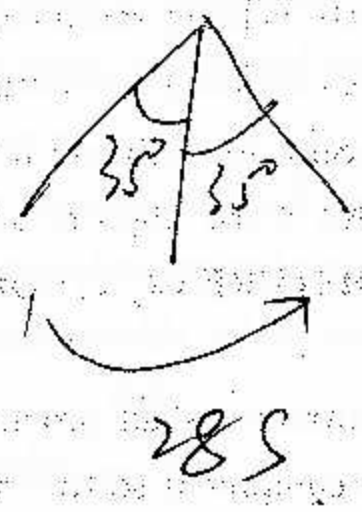
Tankers of 10 000 ton gross tonnage and upwards must have two independent steering gear control systems which are operated from the bridge. Where one fails, changeover to the other must be immediate and achieved from the bridge position. The steering gear itself must comprise two independent systems where a failure of one results in an automatic changeover to the other within 45 seconds. Any of these failures should result in audible and visual alarms on the bridge.

Steering gears can be arranged with hydraulic control equipment known as a telemotor, or with electrical control equipment. The power unit may in turn be hydraulic or electrically operated. Each of these units will be considered in turn with the hydraulic unit pump being considered first. A pump is required in the hydraulic system which can immediately pump fluid in order to provide a hydraulic force that will move the rudder. Instant response does not allow time for the pump to be switched on and therefore a constantly running pump is required which pumps fluid only when required. A variable delivery pump provides this facility.

New words and phrase

steering gear		舵机
rudder	*n.*	舵
response	*n.*	响应
bridge	*n.*	船桥，驾驶台
rudder stock		舵杆
convey	*vt.*	传递，传达
rudder angle		舵角
activate	*vt.*	启动，使活动
transmission system		传动系统
means	*n.*	手段，方法
currently	*adv.*	普遍地，通常地，当前
identical	*adj.*	同一的，同样的
auxiliary	*adj.*	辅助的
torque	*n.*	扭矩，转矩
swing	*v.*	摆动，回转，旋转
shock loading		冲击载荷
pipework	*n.*	管系
exclusive	*adj.*	专用的
as well as	*prep.*	不但……而且
approved	*adj.*	经核准的，被认可的

steering gear compartment		舵机间
tanker	*n*.	油船
gross tonnage		总重量(吨)
independent	*adj*.	独立的
fail	*vi*.	失效，故障
changeover	*n*.	转换，切换
failure	*n*.	失效，故障
audible	*adj*.	听得见的
visual	*adj*.	看得见的
alarm	*n*.	警报，警告器
telemotor	*n*.	液压传动操舵装置
in turn		轮流地,依次
electrically	*adv*.	电力地
instant	*adj*.	立即的，直接的
switch on	*v*.	接通
variable delivery pump		变量输送泵
facility	*n*.	容易,便利，设备，工具



Text 12 Working procedure for the coatings cargo hold systems

CARGO HOLDS

1. Condition of steelwork prior to surface pretreatment
2. Moisture control and ventilation
3. Scaffolding/staging
4. Surface pretreatment
5. Application of coating system
6. Inspection of paint system
7. Dismantling and removal of scaffolding
8. First Cargo
9. Safety and steel preparation sheets
10. System and product data sheets

1. CONDITION OF STEELWORK PRIOR TO SURFACE PRETREATMENT

1.1 In the case of new-building where the pre-construction primer is to remain this must be of an approved zinc silicate type. This should be suitably cleaned to remove any oil, grease, zinc salts etc. in accordance with the specification.

1.2 For maintenance, holds must be gas free and clean (also free of residual cargo/heavy scale).

1.3 All surfaces to be fresh water washed and if necessary with detergent to remove any oil, grease, remaining cargo residue etc., and chlorides in accordance with coating specification and steel preparation sheet No. 1490.

1.4 All welding spatter and slag to be removed.

1.5 All welding and burning in confines of the block (with the exception of join up welds) or hold/adjacent areas should be completed prior to commencement of surface pretreatment.

1.6 All sharp edges to be ground off. Minimum 1 cut.

2. MOISTURE CONTROL AND VENTILATION (during surface pretreatment and coating)

The contractor shall provide sufficient ventilation and where applicable, heating and dehumidification equipment so that substrate is maintained in the correct condition during the contract i.e. surface pretreatment, paint application and curing. The following items are of essential for satisfactory performance of the coating system:

2.1 The steel temperature must be above the recommendation in the respective product data sheet, and at least 3 ℃ above the dew point.

2.2 During in situ application and curing of the coating system the hold must be maintained in a well ventilated condition. This is achieved by the extraction of all solvent vapours from the bottom of the cargo hold (and difficult areas) using flexible trunking which reaches the bottom (inaccessible areas) of the hold during application and curing of the coating system. This ventilation should be continued up to at least 48 hours after application of the coating system, The ventilation/extraction requirements can not be replaced by opening of hatchcovers only.

2.3 When applicable, during surface pretreatment and coating application rain shelters can be erected in way of hold coamings and hold cleaning apertures to prevent ingress of rain, dust and other contaminants.

3. SCAFFOLDING/STAGING

3.1 All staging to be constructed to ensure that maximum safe access to all surfaces is obtained. Special care is to be taken to ensure that staging boards and staging pole ends do not mask areas to be treated.

It is recommended that distance between staging and substrate should be to a minimum of 30 cm and maximum of approx. 60 cm. All contact between scaffolding poles and steel surfaces is to be point contact only i.e. spade ends to be fitted.

3.2 Corrugated bulkheads must be staged to give adequate safe access to recessed areas to enable surface preparation, paint application and inspection to be carried out.

3.3 All staging must be capable of being cleaned satisfactorily.

3.4 Use of Cherry Pickers instead of staging, is not recommended. The use of Cherry Pickers will have a reversed impact on the good execution of the application and inspection.

4. SURFACE PRETREATMENT

4.1 The surface pretreatments specified are dependant on the situation i.e. new building or maintenance and also the coating system to be applied. More details regarding the actual surface preparation grade can be found on the product/system data sheet and/or the coating specification.

4.2 For grit blasting operations fresh, preferably mineral grit shall be used. Recycled grit is not recommended.

4.3 This specification also covers mineral abrasives such as angular corundum, aluminium silicate, slag or any slag mixtures which are suitable for removing rust, scale, old paint or shop primer from the holds by blast cleaning.

4.4 The mineral abrasive may be any material meeting the requirements of this specification. It shall be composed of clean, sound, hard particles free from foreign substances such as dirt, oil, grease, toxic substances, paint, organic matter and water soluble salts, having a conductivity of less than 300 cm/μs.

For ultra high-pressure water washing clean fresh water must be used.

5. APPLICATION COATING SYSTEM

5.1 To be applied directly to pretreated substrate accordance with relevant specification, system and product data sheets.

5.2 In maintenance situations where multi coat systems are applied, it is recommended that entire hold is coated with the primer before application of subsequent coats takes place.

5.3 Allowance must be made in the programme for stripe coating of all weld seams, back of bars, edges of cut outs, scallops, plate edges, ladders and hand rails etc. Each coat of the system must be followed by a stripe coat prior to spray application of the subsequent coat.

5.4 Excessive thickness of paint will not be acceptable. Each coat of the system must be inspected including stripe coating and accepted by the Sigma Coatings field engineer prior to any stripe coating being done for the next coat.

5.5 Each coat of the system must be a closed film and should be free from overspray, curtaining, sags, holidays, grit and dirt inclusion. Any such defects should be repaired prior to the application of the next coat of the system, and within the overcoating limits of the paint.

5.6 The time interval between application of the various coats of the system must be held in strict accordance with the latest system sheet and/or product data sheets based on prevailing ambient conditions.

6. INSPECTION OF PAINT SYSTEM

Final touch up and stripe coating should be carried out within the overcoating times as specified in latest product data sheet. This is to ensure good adhesive characteristics between touch up paint and final coat of the system.

7. DISMANTLING AND REMOVAL OF SCAFFOLDING

7.1 Scaffolding will be dismantled only after upper areas have been fully coated and accepted.

7.2 During dismantling of the scaffolding care should be taken to avoid damage to the freshly applied coating system.

7.3 Any areas damaged during dismantling, must be prepared and brought up to required standard and dry film thickness, in accordance with this specification, system sheet and/or product data sheets.

8. FIRST CARGO

It is recommended that after each, but especially after first discharge, the cargo holds are fresh water washed and repairs are done, in order to maintain the holds in good condition.

New words and phrase

cargo hold		货舱
steelwork	*n.*	钢结构
surface pretreatment		表面预处理
moisture	*n.*	湿度
ventilation	*n.*	通风
scaffolding	*n.*	脚手架
staging	*n.*	台架
coating	*n.*	涂料,油漆
inspection	*n.*	检查,视察
dismantling	*n.*	拆卸,拆除
cargo	*n.*	船货,货物
pre-construction primer		车间底漆
silicate	*n.*	硅酸盐
zinc silicate		硅酸锌
grease	*n.*	油脂
hold	*n.*	货舱
residual	*adj.*	剩余的,残留的
scale	*n.*	硬皮
detergent	*n.*	清洁剂,去垢剂
chloride	*n.*	氯化物
sheet	*n.*	工艺单
spatter	*n.*	飞溅
slag	*n.*	焊渣
commencement	*n.*	开始
contractor	*n.*	承包商
dehumidification	*n.*	除去湿气
substrate	*n.*	基体
curing	*n.*	固化
performance	*n.*	性能
recommendation	*n.*	推荐,建议
respective	*adj.*	分别的,各自的
dew point		露点温度
extraction	*n.*	抽出
solvent	*n.*	溶剂
trunking	*n.*	管道

hatchcover	*n*.	舱(口)盖
rain shelter		防雨篷
coaming	*n*.	舱口围板
aperture	*n*.	孔
ingress	*n*.	进入
contaminant	*n*.	污染物
staging board		脚手架跳板
staging pole		脚手架支杆
centimeter	*n*.	厘米
approx	*adv*.	(=approximately)大约,大概
spade	*n*.	铲,铲形物
corrugated bulkhead		槽型舱壁
recessed	*adj*.	凹进的
cherry picker		高空车
reversed	*adj*.	不利的
impact	*n*.	碰撞,影响,效果
execution	*n*.	实行,完成,执行
grit	*n*.	粗砂
preferably	*adv*.	更适宜地
recycle	*v*.	使再循环,反复应用
abrasive	*n*.	磨料
angular	*adj*.	有角的
corundum	*n*.	刚玉,金刚砂
aluminum silicate		硅酸铝
slag	*n*.	矿渣
rust	*n*.	铁锈
scale	*n*.	氧化皮
shop primer		车间底漆
sound	*adj*.	完好的,可靠的,合理的
substance	*n*.	物质
grease	*n*.	油脂
toxic	*adj*.	有毒的
organic matter		有机物
water soluble salt		水溶性盐
ultra	*adj*.	超,极端点
ultra high-pressure		超高压
relevant	*adj*.	有关的,相应的
specification	*n*.	说明书,规格,规范
multi	*n*.	表示"多",多种

primer	*n*.	底漆
allowance	*n*.	允许
stripe	*n*.	条纹
scallop	*n*.	扇形,粗糙度
rail	*n*.	横杆，围栏，扶手
excessive	*adj*.	过多的，过分的，额外的
field engineer		现场工程师
prior	*adv*.	在……前
overspray	*n*.	超范围的喷涂，漆雾
curtaining		(涂后漆膜形成较大面积的)垂落
sag	*n*.	下垂
holiday	*n*.	漏涂
time interval		时间间隔,周期
prevailing	*adj*.	占优势的，主要的
touch up		修补,补漆
adhesive	*adj*.	黏附性的
characteristic	*n*.	特性，特征
scaffolding	*n*.	脚手架
dismantle	*v*.	拆除
prepare	*vt*.	修补
dry film thickness		干膜厚度
discharge	*n*.	卸货

CHAPTER 3 MACHINERY REPAIR (船机维修)

PART 1 Sentences(维修用语)

Exercise 1 Failure(故障)

1. Anything wrong with×?
   ×有问题吗?
2. What's wrong/the trouble with×?
   ×有什么故障(毛病)?
3. There are some troubles with×./Something has gone wrong with×.
   ×出了问题(有故障了)。
4. Out of order/out of operation/out of action.
   失灵,坏了。
5. In trouble.
   有故障。
6. Out of place.
   错位。
7. Out of step.
   步调不一致。
8. The meter is inaccurate. The relay does not function at all.
   这个仪表不准确。继电器根本不动作。
9. The motor failed suddenly. The pump failed to build up pressure.
   电机突然停了下来,泵建立不起压力。
10. The engine runs a bit unevenly.
    机器运转有点不平稳。
11. Sea water has leaked into the fresh water system.
    海水已漏进淡水系统。
12. These nuts are too loose.
    这些螺母太松了。
13. The white metal has been wiped out.
    白合金已被磨掉。
14. There is a crack in the liner.
    缸套上有裂纹。
15. The piston ring has lost its elasticity.

活塞环已失去弹性。

16. The white metal of the lower half bearing is partly detached.
轴承下瓦白合金部分脱落。

17. The valve spindle is bent and twisted.
阀杆已经扭曲变形。

18. There is a non-through crack on the cover.
缸盖上有一非裂穿性的裂纹。

19. The brake is over-worn.
刹车带过度磨损。

20. The boiler is seriously scaled.
锅炉严重结垢。

21. The oil-sealing is defective.
油环损坏。

22. The orifices of this nozzle are almost choked up with carbide.
这个油嘴的喷孔几乎被碳化物堵死。

23. The oil passage is partly blocked.
油路部分被堵死。

Exercise 2 Repair list(修理单)

1. This is an annual repair list (a voyage repair list, a guarantee repair list).
这是一份岁修单(航修单、保修单)。

2. Here is a copy of the repair list.
这是一份修理单副本。

3. I'm the engineer from × shipyard. I've come to check the repair items with you.
我是×船厂的工程师,我是来同你核对修理项目的。

4. There are some additional items to add to the list.
有一些附加项目需要加进修理单。

5. Here is the additional repair list.
这是附加修理单。

6. A new item is to be added to the list.
修理单上需要加上一个新的项目。

7. We will give you our quotations as soon as we receive the additional list.
收到附加修理单后我们就把价目报给你们。

8. Please cancel this item.
请取消这一项。

9. There are some necessary jobs to be added to the list.
有一些必要的工程要加进修理单。

10. It's not difficult for us to do the repair as you require.
按照你们所要求的来修理我们没有困难。

11. We'll finish the work in one week.

我们将在一周内完成这项工作。

12. This item will take another five working days at least.
这个项目至少还要 5 个工作日。

13. Overtime work can be arranged on rest-days with extra charges.
休息日可以安排加班,费用另加。

14. If you are in a hurry, we can arrange overtime for you.
如果你们着急,可以为你们安排加班。

15. How much do you charge for overtime work?
你们收多少加班费?

16. × percent extra for overtime.
加班费另加 × %。

17. Overtime charge for 5 men days.
收 5 个人 8 个小时的加班费。

18. When do you go on shift and off shift?
你们什么时候上下班?

19. Who will supply the necessary spare parts for this item?
谁提供这一项的备件?

Exercise 3 Technical requirement(技术要求)

1. All parts to be reassembled as original.
所有部件按原样重新组装。

2. Ring grooves to be machined up as original size.
环槽按原尺寸加工。

3. Make a new valve spindle according to the drawing.
阀杆按样图新做。

4. One cylinder liner to be newly made as spare.
新做一缸套作为备件。

5. Shaft to be lathed as per attached sketch.
轴按附图加工。

6. Three collar bolts to be fabricated as per sample.
按实样做 3 个带环螺栓。

7. Fresh water pump motor to be tested as required in the specification.
淡水泵电机按说明书规定进行试验。

8. Cylinder liner to be bored as required.
缸套按要求钻孔。

9. Coupling to be skinned up in way of shaft.
联轴节在轴的部位光车。

10. No. 3 and 4 crankpins to be polished in place.
3 号、4 号曲柄销就地抛光。

11. The valve to be replaced in position.

阀装复原位。

12. Cylinder to be hydraulically tested in the presence of C/E and surveyor.
气缸须在轮机长和验船师在场时进行液压试验。

13. Cooling system to be tested to C/E's satisfaction.
冷却系统试验至轮机长满意为止。

14. The heating coils to be hydraulically tested up to 8 kg/cm^2.
水压试验加热盘管需达 8 kg/cm^2。

15. Take the clearance with a feeler.
间隙用塞尺测量。

16. Packing to be renewed with ship's stores.
填料用船方备件换新。

17. Safety valve to be pressured tested.
安全阀应做压力试验。

18. Water tank to be de-rusted and wire-brushed.
水柜除锈并用钢丝刷刷净。

19. Automatic valve to be dismantled for examination.
自动阀应拆卸检验。

20. Cylinder cover to be opened for cleaning.
打开缸盖以便清洁。

Exercise 4 Ship yard(船厂)

1. The contractor's workman.
承修厂工人。

2. Foreman.
领班、工头。

3. The ship chandler.
船舶供应商。

4. Take ashore to repair.
送岸修理。

5. Sent to the work shop for repair.
送车间修理。

6. Sent the impeller shaft of sea water pump to the work shop for straighten.
海水泵叶轮轴送车间矫直。

7. I'm in charge of your repair work.
我负责你们的修理工作。

8. When do you start working in the morning/stop working in the afternoon?
你们早上几点上班/下午几点下班?

9. Will you work at night?
你们夜里加班吗?

10. Who will in charge of the fire-fighting work during the repairs?

修理期间,谁负责消防工作?

Exercise 5 Main engine operation(主机操作)

1. Warm the main engine.
   暖机。
2. Examined every parts of eng. and ascertained its condition.
   诸部件及其状态已检查确认。
3. Ascertained no leak of ×.
   确定×无滴漏。
4. Examined and adjusted tappet clearance of suction and exhaust valves.
   进、排气阀顶杆间隙已检查和调整。
5. Take off the turning gear.
   脱开盘车机。
6. All ready for sea going.
   开航准备完毕。
7. Tried main engine several times ahead and astern.
   主机进行了数次正倒车试验。
8. Run the engine several revolutions.
   冲车数转。
9. Take indicator cards and calculate I.H.P.
   测取示功图并计算指示马力。
10. Get equal power in each cylinder.
    平衡各缸功率。

Exercise 6 Diesel engine inspection and repair(柴油机检修)

1. Open out No.5 cylinder and take out the piston.
   打开5号气缸盖并取出活塞。
2. Overhaul No.3 cylinder.
   检修3号缸。
3. There's a through crack in the liner.
   缸套上有条穿透性裂纹。
4. Examine and clean the air starting valves.
   检查并清洁起动空气阀。
5. Clean around scavenging ports.
   清洁扫气口周围。
6. Take out and examine the fuel injection valves of each cylinder.
   取出并检查各缸喷油器。
7. Adjust the opening pressure for fuel valve.
   调整油头的开启压力。
8. Adjust injection pressure to 280 kg/cm^2.

把喷射压力调整到 280 kg/cm^2。

9. Take out the fuel injection valves on each cylinder and clean the tip of the valves and then do the atomization tests.
取出各缸喷油器,清洁喷嘴并做雾化试验。

10. Check piston clearance at top dead center of the stroke.
在上止点测量活塞与缸套之间的间隙。

11. Overhaul the thrust bearing.
拆修推力轴承。

12. Measure the diameter of the shaft.
测量轴的直径。

13. Measure the diameter of No. 1 crank pin.
测量 1 号曲柄销径。

14. Remove the top half brasses of all main bearings and measure crankshaft worn down with bridge gauge.
拆下各主轴承上瓦,用桥规测量曲轴的磨耗。

15. Measure the clearance of bearings by pressing lead wires.
用压铅法测量轴承间隙。

16. Adjust bearing clearance with shims.
用垫片调整轴承间隙。

17. Put in a sheet of 2 mm shim.
装进一张 2 mm 的垫片。

18. Put off two sheets of 1/2 mm copper liner.
抽出两张 0.5 mm 的铜垫片。

19. Remove bearing caps and carefully examine the journals.
拆下轴承盖,仔细检查轴颈。

20. Examine carefully the crank pin for flaws or hair cracks.
精心检查曲柄销颈有无缺陷或微小裂纹。

21. Remove scale and deposit from cooling space in cylinder cover.
清除缸盖冷却水腔的水污和沉积物。

22. Measure the diameter of cylinder liner.
测量缸套直径。

23. File off the ridges on the top and bottom of the liner.
锉去缸套上、下方的划痕。

24. Scrape off the ridges on the top and bottom of the liner with grinder.
用风砂轮拂去缸套上、下方的划痕。

25. Lift all the piston rings and clean properly the ring grooves, and renew 2 compression rings and 1 oil scraper ring.
取出全部活塞环并彻底清洁环槽,换新 2 根压缩环和 1 根刮油环。

26. The piston ring has lost its elasticity.

该活塞环已失去弹性。

27. The piston ring is worn out.
该活塞环已过度磨损。

28. All piston rings should be taken out from the ring grooves.
将所有的环从环槽中取出。

29. Test hammering the nuts of the bolts for looseness.
以锤敲击螺帽检查松动。

30. Drain out all the oil in reduction gear casing and refill with fresh oil.
减速齿轮箱内的油全部放出,补入新油。

31. Clean the oil strainers periodically.
定期清洗油滤器。

32. Chip and scrape the corroded part of engine room bulkhead and touch up with red lead paint.
铲、刮机舱舱壁锈蚀部分以红丹漆修补之。

33. Shift 2 liners from upper deck into engine room.
将上甲板的 2 只缸套搬进机舱。

34. Dismantle the pump to check its seal.
拆开泵检查它的密封。

35. The piston should be lifted out together with its rod.
将活塞连同活塞杆一起吊出。

36. Disconnect all the piping connections before dismantling the cylinder head.
在拆卸缸头之前先拆除所有的连接管。

37. Stamp a center mark.
打一个中心标记。

38. Check the deflection of the crankshaft both before and after repair.
在修理前和修理后都要检查曲轴的变形情况。

39. Would you please inspect the pumps?
请检查一下泵好吗?

40. Check the alignment of the piston by measuring the clearance between the piston and the cylinder.
通过测量活塞与缸套之间的间隙来检查活塞的对中情况。

41. Measure the shaft diameter with a pair of outside calipers.
用一对外卡钳来测量轴的直径。

42. Calibrate the cylinder liner. (Measure the internal diameter of the cylinder.)
测量(校准)缸套内径。

43. The normal diameter of the thrust shaft is 600 mm, its tolerance is plus zero and minus 0.005 mm.
推力轴的名义直径是 600 mm,其公差是正零和负 0.005 mm。

44. Take the wire readings on No. 1 to No. 6 main bearing.

压铅法测量1到6号主轴承。

45. Scrape the main bearings.
修刮主轴承。

46. The shaft dismantled should be remachined.
拆下的轴应重新加工。

47. These plungers should be reground.
这些柱塞应重新研磨。

48. Patch up the areas where the plates are rusted.
锈蚀的板打补丁。

49. Weld up the cracked piston crown.
焊补裂开的活塞顶。

50. Metalock the crack on the pump casing.
用金属扣合法修补这个泵壳上的裂纹。

51. It is most convenient way to cut this plate by the oxy-acetylene flame.
用氧炔切割枪来切割这块板最方便。

52. Bore the cylinder liner.
膛缸。

53. The cylinder liner should be chromium-plated after it is bored.
缸套膛孔后应镀铬。

54. File off the ledge.
锉去这些凸起部分。

55. The shaft should slotted.
应在轴上开一个槽。

56. The quality of this material is rather poor.
这些材料的质量非常糟糕。

57. The shaft for the ballast pump should be from anticorrosive alloy.
压载泵的轴应选用耐蚀合金。

58. We have no such alloy, can we use other kind of material instead?
我们没有这种合金,能否用其他材料代替?

59. The pipes should be of heavy-duty material.
这些管子应该用耐重载荷材料制成。

60. This material is heat-resistant and anticorrosive.
这种材料耐热耐腐蚀。

61. Renew the plunger.
换新柱塞。

62. Change the packing if it is necessary.
如果必要的话更换填料。

63. There is no other way but renewing it.
除了换新没有别的方法。

64. The seal rings should be replaced by ship's spares.
密封环用船上的备件更换。

65. The carbon deposits on the piston crown and in the ring grooves should be scraped away.
活塞顶和环槽中的积炭应被刮去。

66. Wash the cooler with soda solution.
用苏打水冲洗冷却器。

67. Please repair × by metalock.
×用波浪键扣合法修理。

68. Take the crank deflection of main engine.
测量主机臂距差。

69. Please check the upper surface condition of the piston crown with a template.
请用样板检查活塞顶烧蚀了多少。

70. Have you checked the clearances of the gas valves?
你检查过气阀间隙吗?

71. The vertical play (gap clearance) of the piston ring should be measured.
应测量活塞环的天地间隙(搭口间隙)。

Exercise 7 Check and accept(验收)

1. Which classification society are you connected with?
你们和哪个船级社有联系?

2. All the items should be surveyed by classification society.
所有项目应通过船级社的检验。

3. I have invited a surveyor from Lloyd's Register.
我已请了劳氏船级社的验船师。

4. Please give me 3 copies of the records after the test.
请将试验报告交给我一式三份。

5. ×should be tested in the presence of chief engineer.
×应该轮机长在场时试验。

6. Our supervisor will attend this test.
我们的机务主管要参加验收。

7. Please issue the report.
请签发报告。

8. Test the cylinder covers hydraulically.
气缸盖进行液压试验。

9. Did these parts pass magnaflux-tests?
这些部件经过磁力探伤试验了吗?

10. The main engine must undergo both mooring and sea trials.
主机必须经过系泊试验和航行试验。

11. Dynamic balance test should be carried out to the rotor of the turbocharger.
涡轮增压器转子应进行动平衡试验。

12. The repaired propeller should be statically balanced.
修理后的螺旋桨应进行静平衡。

PART 2 Reading materials(阅读材料)

Text 1 Introduction of diesel engine

The diesel engine is a type of internal combustion engine which ignites the fuel by injecting it into hot, high pressure air in a combustion chamber. The marine diesel engine is a type of diesel engine used on ships. The principle of its operation is as follows:

A charge of fresh air is drawn or pumped into the engine cylinder and then compressed by the moving piston to very high pressure.

When the air is compressed, its temperature rises so that it ignites the fine spray of fuel injected into the cylinder. The burning of the fuel adds more heat to the air charge, causing it to expand and force the engine piston to do work on the crankshaft which in turn drives the ship's propeller.

The operation between two injections is called a cycle, which consists of a fixed sequence of events. This cycle may be achieved either in four strokes or two. In a four-stroke diesel engine, the cycle requires four separate strokes of the piston, i.e. suction, compression, expansion and exhaust. If we combine the suction and exhaust operations with the compression and expansion strokes, the four-stroke engine will be turned into a two-stroke one, as is shown in Fig. 3.1(a) ~(d).

The two-stroke cycle begins with the piston coming up from the bottom of its stroke, i.e. bottom dead center (BDT), with the air inlet ports or scavenge ports in the sides of the cylinder being opened (Fig. 3.1 (a)). The exhaust ports are uncovered also. Pressurised fresh air charges into the cylinder, blowing out any residual exhaust gases from the last stroke through the exhaust ports.

As the piston moves about one fifth of the way up, it closes the inlet ports ,and the exhaust ports. The air is then compressed as the piston moves up (Fig. 3.1(b)).

When the piston reaches the top of its stroke, i.e. the top dead center (TDC), both the pressure and the temperature of the air rise to very high values. The fuel injector injects a fine spray of fuel oil into the hot air and combustion takes place, producing much higher presser in the gases.

The piston is forced downward as the high pressure gases expand (Fig. 3.1(c)) until it uncovers the exhaust ports. The burnt gases begin to exhaust (Fig. 3.1(d)) and the piston continues down until it opens the inlet ports. Then another cycle begins.

In the two-stroke engine, each revolution of the crankshaft makes one power or working stroke, while in the four-stroke engine, it takes two revolutions to make one power stroke. That is why a two-stroke cycle engine will theoretically develop twice the power of a four-stroke engine

of the same size. Inefficient scavenging and other losses, however, reduce the power advantage to about 1.8.

Each type of engine has its application on board ship. The low speed (i. e. 90 to 120 r/min) main propulsion diesel operates on the two-stroke cycle. At this low speed the engine requires no reduction gearbox between it and propeller. The four-stroke engine (usually rotating at medium speed, between 250 to 750 r/min) is used for alternators and sometimes for main propulsion with a gearbox to provide a propeller speed of between 90 to 120 r/min.

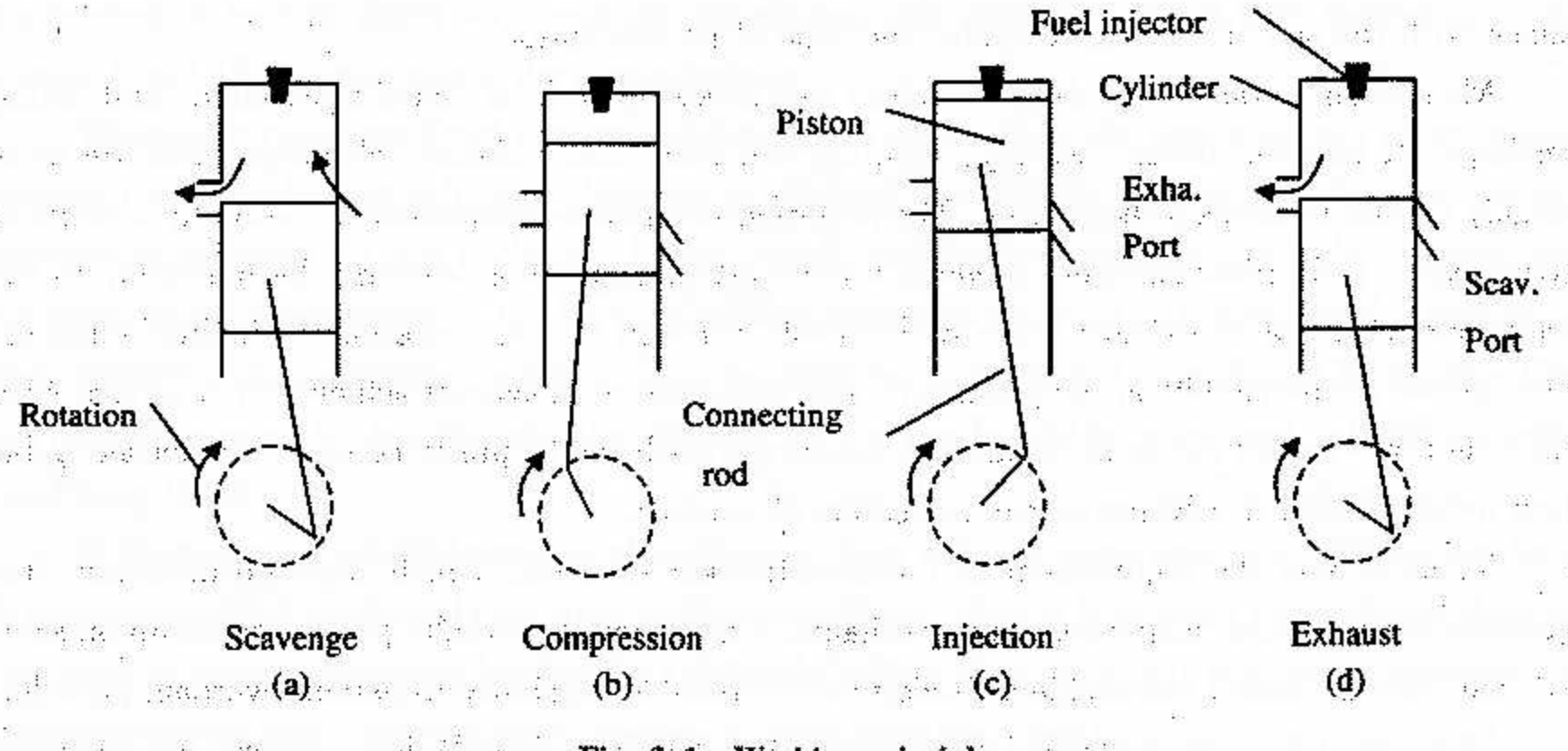


Fig. 3.1 Working principle

New words and phrase

diesel	*n*.	柴油,柴油机
internal	*adj*.	内部的
combustion	*n*.	燃烧
inject	*vt*.	注射,喷射
combustion chamber		燃烧室
marine	*adj*.	海的,海产的,航海的,船舶的
cylinder	*n*.	气缸
piston	*n*.	活塞
spray	*n*.	(水、油)雾;*vt*.喷雾
fine	*adj*.	美好的,细小的
exhaust	*vi*.	排气;*n*.排气装置
crankshaft	*n*.	曲轴
propeller	*n*.	推进器,螺旋桨
stroke	*n*.	冲程
bottom dead center (BDT)		下止点
top dead center (TDC)		上止点
scavenge	*n*.;*v*.	扫气
residual	*adj*.	剩余的,残留的

fuel injector		喷油器
propulsion	*n*.	推进，推进力
reduction gearbox		减速齿轮箱
alternator	*n*.	交流发电机

Text 2 Overhauling and maitenance(I)

Maintenance requirements differ somewhat between slow, medium-and high-speed engines, and inevitable as regards detail, the frequency and complexity, of maintenance will be in accordance with the age of the engine and/or the time of its conception.

Maintenance starts with daily attentions like checking oil level, hand lubrication, and taking readings. It goes on through weekly, monthly and then longer checks, although these are more usually quoted in terms of hours run. The attention required or recommended naturally mounts in complexity, from filter changes, cleaning the cooler, cleaning and resetting the injectors, to exhaust port cleaning or exhaust valve withdrawal, through to major overhauls. Maker's recommendations are inevitably on the pessimistic side compared with average achievement, so that even the operator who has the worst conditions to contend with can be pretty certain of undertaking his first overhaul well in advance of any indication of trouble.

There is also the requirement of the classification societies, which stipulate minimum frequencies for particular inspections and overhauls. The societies naturally place a premium on safety, but they do take a reasonable attitude to demonstrable capability to extend overhaul periods.

The reason for any overhaul (unless a problem has been found) is to correct for wear, to eradicate deposits where they interfere with efficiency of components, and to restore surface treatments. It is also an opportunity to look for signs of trouble, such as incipient cracking, evidence of any misalignment, or undue wear, corrosion or leakage.

Pistons

In two-stroke engines pistons, and their rings, must pass over ports, which inevitably interrupt the oil film and create difficulties for the ring ends and edges. On the other hand, rings can easily be examined through the ports without significant dismantling.

Gas leakage past the pistons should never be allowed to become pronounced. At best it prejudices lubricating conditions and promotes wear; at worst it could initiate a seizure. It obviously does not improve efficiency though its effect on performance is most noticeable at low speed, and it may make starting very difficult.

The condition of the piston ring grooves is, of course, important. If there is any indentation of the groove surfaces in way of the ring ends, the ring groove will require to be machined out to take an oversize ring. If this is done, the finish and profile of the ring groove must be correct, since, if it is not good, gas can blow past the ring via the back of the groove.

On engines incorporating holes in the cylinder liners for piston lubrication, these should be cleaned periodically. In crosshead engines a scraper ring device for the piston rod is fitted on the crankcase top. Occasionally it should be confirmed that the segments of the ring are not butting, thus preventing the ring from functioning efficiently.

Piston rings

On larger two-stroke engines it is general practice to radius or bevel the upper and lower edges of the piston ring working faces, ostensibly to assist in retaining the lubricating oil film; but this is definitely not recommended for four-stroke engines.

Piston ring manufacture is a specialized business, and to achieve a truly cylindrical ring working surface when fitted in the cylinder calls for fairly complex pre-forming of the ring in the unstressed state. If in emergency a ring has to be obtained from an unauthorized supplier, it would be prudent at least to check for circularity by placing it in the liner with a light behind it to see that it fitted all the way round the circumference.

When new rings are fitted care must be taken to ensure that the gap is correct (four-stroke engines) or that there is sufficient clearance in the laps (two-stroke engines) to allow for the expansion of the rings. If this is checked by placing the ring in the liner, the check should obviously be made at an unworn part of the bore. If enough wear has occurred at the top dead center position to leave a distinct ridge, either it must be removed or a stepped ring should be fitted. This particularly applies if, in addition, the top ring groove has had to be machined out and an oversized ring fitted.

If the engine is using chromium plated liners, then on no account must any of the rings have a chromium plated surface. If the liner surface is cast iron, then it is prudent to break the glaze on the liner to assist subsequent bedding-in (naturally taking great care that any debris generated is prevented from entering crankshaft oilways or other sensitive areas).

Cylinder liners and jackets

With adequate control of coolant and lubricant quality, treatment, pressure, temperature and flow, it is not necessary to withdraw pistons in a modern design engine unless the condition monitoring indicates a developing fault, or until the interval recommended (or modified in the light of experience), has elapsed.

When they are withdrawn the condition and wear of the liners can be noted and, in two-stroke engines, carbon deposits removed from the ports. The sign of port clogging is a steady rise in exhaust temperature over a period, accompanied by an increase in air pressure.

Cylinder jackets in large engines are provided with inspection doors through which the water spaces can be examined. However, with correct water treatment this should be unnecessary, short of major overhauls. In addition, frequent inspection can be expensive if the treated water has to be discarded, or tedious if it has to be stored for re-use. If water treatment is not in use, then the examination should certainly be carried out fairly frequently, for instance at intervals of about six months.

It is important that rubber rings used to seal liners to jackets or water space in cylinder blocks should be of the correct size and material. If the ring is too large for the groove there is a serious risk that it may be volumetrically compressed in the groove when the liner is in place and this will produce a constriction in the bore which will upset the behaviour of the piston. The ring should not project more than one millimeter above the metal surface before fitting the liner, for a 10 cm

groove.

New Words and phrase

maintenance	*n*.	维护,保持
overhaul	*v*.	拆检,拆修,大修,检修
inevitable	*adj*.	不可避免的
complexity	*n*.	复杂(性)
manufacturer	*n*.	制造业者,厂商
check	*n*.	检查
oil level		油位
lubrication	*n*.	润滑,润滑油
quote	*vt*.	引用,引证
mount	*vt*.;*n*.	安装,装配
filter	*n*.	过滤器
clean	*n*.	清洁,清洗
cooler	*n*.	冷却器
withdrawal	*n*.	收回,撤退,拔出,排出
pessimistic	*adj*.	悲观的,厌世的
contend	*n*.	竞争,争夺
trouble	*n*.	故障,问题
classification society		船级社
inspection	*n*.	检查,视察
premium	*n*.	奖金,保险费
demonstrable	*adj*.	可论证的
survey	*n*.	测量,调查,勘查
wear	*n*.	磨损
eradicate	*v*.	根除
deposit	*n*.	堆积物;*vi*.沉淀物,沉淀
component	*n*.	部分,部件,成分
incipient	*adj*.	初始的
cracking	*n*.	破裂
misalignment	*n*.	不成一直线,不对准
corrosion	*n*.	腐蚀
leakage	*n*.	漏,泄漏,渗漏
film	*n*.	薄膜
facility	*n*.	设备,工具
suffice	*vi*.	足够,有能力;*vt*.使满足
seizure	*n*.	卡住,咬住
liner	*n*.	内衬,衬板,衬套
piston crown	*n*.	活塞头

constraint	*n*.	约束,限制
indentation	*n*.	凹口,齿痕,刻痕
oversize	*adj*.	太大的;*n*. 特大型
finish	*n*.	精加工,光制
profile	*n*.	剖面,侧面,外形,轮廓
crosshead	*n*.	十字头
scraper ring		刮油环
segment	*n*.	段,节,片断
butting	*n*.	对接
gudgeon pin		活塞销
bevel	*n*.	斜角(面),斜角规,倾斜
coincide	*vi*.	一致,符合
anchor	*n*.	簧片,锚,衔铁
prudent	*adj*.	谨慎的
circularity	*n*.	环状
ridge	*n*.	隆脊
chromium	*n*.	铬
plate	*vt*.	镀(金,银等),电镀
glaze	*n*.	光滑面,上光
debris	*n*.	碎片,残骸
carbon deposit		积炭
clog	*n*.; *v*.	堵塞,阻碍
discard	*vt*.	丢弃,抛弃,放弃
tedious	*adj*.	单调乏味的,沉闷的,冗长乏味的
volumetric	*adj*.	容量的,测定体积的
constriction	*n*.	压缩,收缩
bore	*n*.	孔

Text 3 Overhauling and maintenance(II)

Running in

At one time the experienced engineer considered it prudent to give any new or disturbed combination of sliding surfaces an opportunity to bed-in before applying full load to them. In large engines, running in parts of one or two cylinders is achieved by cutting back the fuelling on these cylinders for a few hours.

The need for running in arises:

1. Since the distribution of temperature around, across and down both the piston and liner is not uniform, neither is the expansion, and neither, therefore, is the shape.

2. For obvious reasons only a minimum of lubricating oil may be used.

3. It would be uneconomic, if not virtually impossible, to try to produce an ideal bedding surface on the components before they are assembled. The bedded-in profiles of rings, for exam-

ple, are quite complex.

When new components are run together, or are introduced in combination with older components, the mating surfaces are likely to bed unevenly. This will produce harder contact, and hence heat, but also wear which will tend towards an even distribution of the contact pressure round the periphery. In addition, it is likely that asperities all round the initial surface of the two components will break through the lubricating oil film and also cause heat and wear.

If the engine is run at full load immediately, the heat generated is likely to build up until serious damage and wear debris results. The point of running in is to control this heat and the generation of abrasive debris, while the wearing-in process continues and therefore the generation of heat tends to diminish. The progressive raising of the speed and load is, in effect, maintaining the heat of the wearing-in process as high as is safe until bedding-in is complete and fully lubricated contact is achieved.

It follows that, within reason, rough surfaces will bed-in more easily than smooth ones. This is why it is good practice to break the glaze on a used liner when new rings are fitted. If two polished surfaces are to be bedded the high spots are much more likely to lead to scuffing, because without the asperities of a roughened surface the surface is less likely to retain enough oil to control the temperature and to flush away wear debris.

Fuel valve testing

When examining fuel valves, all parts must be washed clean. They should be dried by warmth or air circulation only. It is essential not to use any kind of cleaning rag because particles of fluff may adhere to the cleaned parts, eventually to find their way into the injection holes, impede the spray and cause the injection pressure to rise, thus reducing the quantity of fuel oil injected. If rags and cotton waste have been used for cleaning fuel valve parts during the overhauling the consequences may be burst pipes, leaky joints and the necessity for the frequent changing of fuel valves.

When changing a nozzle piece, great care should be taken not to damage the valve spindle or its sleeve. While the nozzle piece is out of the fuel valve, the center hole should be cleaned with a spiral drill and the pulverizer holes with a special cleaning needle. Should the nozzle face be pitted or scratched, the defects can be ground away against a surface plate or against the face of another nozzle. A nozzle with a damaged face should never be reused.

To pressure-test a fuel valve: the valve is connected to a test pump and then, after fuel oil has been pumped through the line and all air forced through the valve air vent, the pressure at which the valve actually opens is observed on the pressure gauge. The correct lifting pressure is stated on the adjustment sheet for the engine. The adjusting screw for the spring is now set so that the spindle lifts at this pressure: the screw is then locked in position and the lift pressure rechecked. Next, the nozzle is wiped thoroughly clean and pressure reapplied, this time to 10 kgf/cm^2 below the injection working pressure. If the pressure remains steady for a few minutes the valve is tight. A trace of oil at the nozzle holes is of no importance, as the valve will normally be worked-in completely after a few minutes of running. However, should the nozzle become wet

or should drops appear, then replacement or regrinding of the valve is necessary.

Where the injector has a conical seat (including all four-stroke engines) it is essential to test the action of the injector by working the handle of the tester fairly briskly and observing that a good spray issues from each hole of the injector. The relative condition of the spray holes can be checked by placing a piece of cardboard just below the tip (not held by hand) and depressing the tester handle briskly once. The pattern (for a symmetrical nozzle) should be symmetrical.

While tightness and quality are the main points it is worthwhile to operate the injector test slowly and observe that the nozzle 'chatters'. That is to say, it operates in a rapid series of short bursts of atomized fuel and does not imitate the action of a watering can. The latter case would imply that the needle was seating on the inner rather than the outer edge of the seat.

Another method is, when perfectly cleaned, to hold the house at an angle of about 45° to the horizontal—the spindle should be able to slide out of the housing by its own weight.

New words and phrase

running-in	*n*.	磨合
slide	*v*.	(使)滑动
render	*n*.	再现
assemble	*n*.	安装,装配
bedding-in	*n*.	磨合
uneven	*adj*.	不平坦的,不平衡的
spin	*v*.;*n*.	旋转
abrasive	*n*.	研磨剂;*adj*.研磨的
scufling	*v*.;*n*.	刮(磨、擦、划)伤
asperity	*n*.	粗糙(度),不平滑
flush	*vt*.	淹没,冲洗
rag	*n*.	抹布
fluff	*n*.	软毛,柔毛,绒毛
adhere	*vi*.	粘附,胶着
impede	*v*.	阻止
purify	*vt*.	使纯净,净化
spiral	*adj*.	螺旋形的
pit	*vt*.	使凹下,使留疤痕
scratch	*vt*.	乱涂,勾抹掉,擦,刮,搔
trace	*n*.	痕迹,踪迹
briskly	*adv*.	活泼地,生气勃勃地
cardboard	*n*.	纸板
tip	*n*.	顶,尖端
symmetrical	*adj*.	对称的,均匀的
chatter	*n*.	抖动,咔嗒声,震声
imitate	*vt*.	模仿,仿效,仿制,仿造

horizontal *adj.* 地平线的，水平的

Text 4 Engine installation

For a propulsion engine to operate successfully in a ship great care must be taken in the initial installation of the engine in the vessel. This care extends to more than just the correct alignment of the engine to the propeller shaft or gearbox and being adequately supported on firm mountings but to the adequate sizing and mounting of suitable auxiliary machinery, the provision of auxiliary power and the measures to reduce noise and vibrations.

A topic of great importance also is the inter-action between the engine and the ship and torsional vibrations generated by the engine being transferred through the seatings to the hull. Today, engine builders are able to accurately assess the generation of unbalanced couples, moments and torsional vibrations and have adequate methods of eliminating them even with engines of very few cylinders.

Engine Seating and Alignment

The seating to which the main engine is bolted is of great importance because not only must it support an engine of in many cases great weight and bulk but it must also transmit the propeller thrust to the hull itself, particularly as modern engines have the thrust block built into the engine bedplate.

The normal practice is for engine seatings to be a fabricated box structure built as an integral part of the ship's double bottom and having sufficient stiffness to support the weight of the engine, transmit the thrust, withstand external couples from the engine and avoid resonance with propeller or engine excitation.

The engine bedplate is not bolted directly to the foundation but seated on cast iron or steel chocks to facilitate alignment to the propeller shaft. The tail shaft aperture is normally bored in position during construction of the vessel and thus remains in a fixed non-adjustable attitude. It is necessary, therefore, to align any intermediate shafting and the engine crankshaft with the tail shaft as accurately as possible to avoid trouble in service. While fitted chocks is the normal seating method for engines quite a number of engines today are seated on pourable resin chocks.

Special jacks are used to align the engine with the shafting and after building a dam around the vicinity of the holding down bolts along each side of the bedplate, the liquid resin is poured in and allowed to set hard and maintain the initial alignment. The engine is held down on the iron, steel or resin chocks by hydraulically tensioned bolts while side chocks are necessary to resist horizontal inertia or collision forces and side brackets usually fitted to transmit the propeller thrust from the shafting (thrust block) to the foundation. Collision chocks fitted as a stopper to prevent the engine from moving on impact of the ship with an external object, or grounding, must be carefully fitted with extreme care being taken to allow for thermal expansion of the engine structure.

It is not uncommon for medium speed engines and reduction gears to be rigidly mounted on the raft to facilitate alignment between engine and gears with a flexible coupling between the gear output and the propeller shaft.

Flexible mounts are most suitable for passenger vessels, research ships, and warships where it is desired to eliminate as much machinery noise and vibration as possible. On many ships, however, it is common to flexibly mount auxiliary engines as these can be the source of the most irritating noise and vibration.

Optical Alignment Checks

It is sometimes impossible or not accurate enough to use a piano wire to measure the relative axes of a stern tube and shafting, particularly on small bore shafting; in these instances optical methods are used. The best known equipments for optical alignment checks are sighting telescope, photo sighting, laser beam, etc.

A system now in use by classification societies for checking the alignment of stern tubes, engine bearings uses a special sighting telescope which is supported on a table and a series of sighting discs, each with a center hole, that are located in the stern tube bearing housings. The telescope incorporates a zoom lens to make it possible to focus or read the whole series of sighting marks and by micrometer adjustment misalignment can be recognized and measured.

For certain applications such as measuring variations in distortions, a laser beam can be used in addition to the telescope to more easily see the sighting axis.

Reaction Measurements

A method of checking propeller shaft alignment is by measuring the reaction of bearings by weighing. This consists of placing of dial gauges on top of the shaft and jacking up the shaft from underneath to simultaneously measure the displacement of the shafting and the load necessary to lift the shaft by the jacks. Several series of weighings are sometimes necessary to establish correct shaft alignment so a printer is used to record as many as five or six load and displacement signals.

Another method is based on measuring and interpreting actual bending moments in different parts of a shafting with strain gauge bridges placed immediately next to each bearing. By using a pocket computer program it is possible to determine in situ the values of static reactions from the bending moments measured. This method can also be applied to shafting in rotation.

Misalignment can cause undue wear on shaft bearings and even bending forces on the shafts. Today, shafts are aligned using laser techniques and computer calculations to determine load reactions on each bearing in the system and determine that these are within safe limits.

Alignment adjustments are usually made by working from the propeller to the main engine as once the supports are installed they cannot be altered. When the tail shaft and engine shaft have been correctly aligned by piano wire or optical methods, the object then is to align the intermediate shafting to the fixed positions of tail shaft coupling and engine thrust shaft coupling. With the current tendency towards all aft machinery on most vessels, alignment becomes far more critical because of the shorter lengths of shafting between engine and tail shaft.

This alignment, by individual adjustment of supporting bearings can be carried by measurement of the clearances between flanges before they are rigidly coupled. In the gap and sag method, the alignment starts with the propeller mounted on the shaft and measurements are taken at the top and bottom of the flanges and sides and the bearing is adjusted until all clearances are equal,

before tightening of the flanges.

Crankshaft Alignment

The alignment of the engine and shafting is set when a ship is built or re-engined and should not need to be adjusted in service. However, the checking of the main engine crankshaft alignment is a task that should be undertaken by the ship's engineer at least once a year or after replacing any main bearing shells or if the ship has grounded.

Crankshaft alignment is checked by measuring the deflections of the crankwebs through one revolution of the shaft. A special dial indicator gauge is inserted between the crankweb to be measured and on rotating the shaft with the turning gear, any change in the between-web distance will be indicated by the gauge as a plus or minus reading, i.e. opening up or closing of the distance, from which it is ascertained whether the main bearings are high or low. The smaller the variation during a revolution the better aligned the shaft remains and for comparison it is important that the gauge be always mounted at the spot on each crank each time.

Readings should be taken at the TDC, BDC and horizontal crank positions and if measurements are taken with the connecting rod in position the gauge should be placed as close to the rod as possible.

The difference between the readings between BDC and TDC are recorded. Values of acceptable deflection vary according to the engine stroke. It is important that the ship's state of loading and the temperature of the engine be as near as possible the same each time deflection readings are taken.

New words and phrase

installation	*n.*	安装
vibration	*n.*	振动，颤动
torsional	*adj.*	扭力的，扭转的
hull	*n.*	船壳，船体，壳体
seating	*n.*	座，设备，座，底板
bulk	*n.*	船舱容积，大宗
bedplate	*n.*	底座，台板，床板
fabricate	*vt.*	制作，构成，伪造，装配
stiffness	*n.*	坚硬，硬度
resonance	*n.*	共鸣，回声，反响
foundation	*n.*	基座
tail shaft		尾轴，推进器轴
aperture	*n.*	孔，穴，缝隙，(照相机，望远镜等的)光圈，孔径
pourable	*adj.*	可倾倒的，流动通畅的
resin	*n.*	树脂，松香
jack	*n.*	插孔，导风板
dam	*n.*	堤坝，拦阻，堰堤，闭塞，阻塞，障碍
vicinity	*n.*	邻近，附近

bracket	*n*.	夹线板,托架
warship	*n*.	军舰，战船
axes	*n*.	轴
stern tube	*n*.	尾轴管
laser beam		激光束
housing	*n*.	壳体,罩壳
zoom	*n*.	缩放
lens	*n*.	透镜，镜头
dial	*n*.	刻度盘
jack	*vt*.	(用起重器)抬起，提醒，增加，提高
strain gauge		应变仪，变形测量器
in situ	*adv*.	(Lat.)在原处
undue	*adj*.	不适当的
aft	*adv*.	在船尾
flange	*n*.	边缘，轮缘，凸缘，法兰
rigidly	*adv*.	坚硬地，严格地
deflection	*n*.	挠度,挠曲,偏差
crankweb	*n*.	曲柄臂
plus	*prep*.	加上;*adj*. 正的，加的
minus	*adj*.	负的,减的;*v*.减去;*n*.负数

Text 5 Types of pump

A pump is a device which adds to the energy of a liquid or gas causing an increase in its pressure and perhaps a movement of the fluid. The basic system consists of a suction branch, a pump and a discharge branch.

Marine pumps fall into two broad classes:

1. *Displacement*. The liquid or gas is displaced from the suction to the discharge by the mechanical variation of the volume of a chamber or chambers. They can be subdivided into two classes, reciprocating pumps, in which a plunger or piston is mechanically reciprocated in a liquid cylinder, and rotary pumps, where the liquid is forced through the pump cylinder or casing by means of screws or gears.

2. *Centrifugal*. Flow through the pump is induced by the centrifugal force imparted to the liquid by the rotation of an impeller or impellers.

DISPLACEMENT PUMPS

Displacement pumps are those where the volume of the pump chamber is alternately increased to draw the liquid in from the suction pipe and then decreased to force the liquid out into the delivery pipe. While their respective characteristics differ in detail they all bear the following main operating features if they are working under non-cavitating conditions:

1. Output is almost directly proportional to speed.

2. Output is marginally reduced at increased pressure – usually there is more slip with less

viscous fluids.

3. The pump will develop a discharge pressure equal to the resistance to be overcome, irrespective of speed.

4. They are self-priming.

ROTARY DISPLACEMENT PUMPS

Positive displacement rotary pumps have largely supplanted reciprocating pumps; they are self-priming and capable of producing high vacua. A number of types have been developed having rotors of special geometrical form. They give a steady flow but are less efficient than reciprocators because of the large areas with running clearance exposed to the differential pressure between suction and discharge. Wear increases the clearances with consequent loss of efficiency, especially when handling low viscosity fluids.

All rotary displacement pumps show the same loss characteristic if the pump is not operating under cavitation conditions.

Types of rotary pump

A variety of types can be found but can be generally sub-classified as follows: screw pumps, rotary vane pumps, lobe pumps and special geometric forms.

Screw pumps

Both double-screw pumps in which the screws are driven in phase by timing gears and triple screw pumps, in which the center screw is driven and the outer screws idle are used at sea, especially for pumping high viscosity liquids such as oil and a variety of other liquid cargoes. Since they are self-priming and able to pump liquid and vapour without loss of suction they are particularly useful when draining tanks of high vapour pressure liquids. They are suitable for operation at high rotational speed and can thus be easily matched with standard electric motors.

Gear pumps

Gear pump consists of two or more meshing gears (spur, single or double helical teeth) enclosed in a close-fitted housing. The oil is carried around the periphery of the revolving gears from the suction to the discharge side. The teeth are meshing between the gears and thus prevent return of oil from the suction to the discharge. As the gears rotate, the fluid is trapped between their teeth and the casing and is carried around to the discharge. Since the liquid cannot escape back to the suction, a pressure builds up sufficient to force it out the discharge pipe.

Vane pumps

All vane pumps have a rotor driven within a ring (cam ring) by a drive shaft coupled to a prime mover. A cylindrical rotor with sliding vanes, generally in radial slots, rotates within the ring. In a simple vane pump, the center of the rotor is offset from the center of the ring, leaving a crescent-shaped chamber between rotor and the ring. As the rotor turns, the vanes are forced outward against the inner surface of the cam ring by centrifugal force. This outward radial movement of the vanes and turning of the rotor causes the chamber between the vanes to increase as the vanes pass further away from the inlet port. This increase in volume results in a lowering of pressure until the atmospheric pressure is sufficient to force oil from the reservoir into the inlet cham-

ber. Oil from the inlet is swept away by the vanes toward the outlet port through a decreasing series of chambers until it is forced through the outlet port. A vane pump of balanced design has an elliptical cam ring so that two pumping chambers are formed. This pump is in hydraulically balance, since the two intake ports and two outlet ports are diametrically opposed to each other. Therefore the side loads exerted on the rotor cancel out, thereby increasing bearing tire and permitting high operating pressure.

CURING TROUBLES—CENTRIFUGAL PUMPS

Failure to deliver water

First, make sure the pump is primed. The fault may be that the discharge head is too high, or the suction lift is too high. It should not be more than 4.7 m at 29.4 ℃. There may be insufficient speed; it was explained earlier in this chapter that the pressure or head at the periphery of the impeller depends upon the tip speed. Other faults to look for are an air leak in the suction line, or a broken or plugged-up impeller. The direction of rotation of the impeller should, also be checked.

Pump will not prime

If the pump will not prime, the most probable cause is an air leakage of some sort. If there is a leakage at the pump gland, the gland should be adjusted and the recess filled with oil or the stuffing-box re-packed. All joints should be checked for a leak in the pump or suction pipe. Make sure that the delivery valve is not open.

The priming pump float gear, if fitted, should be removed and examined to ensure that the filter protecting the float valve has not become choked, nor the ball disconnected, allowing the spring to close the valve.

In bilge applications a frequent reason for failure to prime is a faulty bilge suction valve.

Failure to build up pressure

If the pump fails to build up adequate pressure, or to discharge water when the discharge valve is opened and the speed brought up to normal then the following checks should be made.

Stop the driving unit. Make sure that the pump is primed, that all air has been expelled through the air-cocks on the pump casing, and that all valves in the suction line are open. Start the pump again, and if the discharge pressure is still not normal, stop the pump and find the exact cause of failure. It may be that the speed is too low, or that there is air in the water. The impeller may be damaged or the wearing rings worn, or some other mechanical defect may require attention.

Insufficient capacity

As with complete failure to deliver water, check first the whole pump arrangement. The total dynamic head may be higher than that for which the pump is rated, or the suction lift may be too high. Check also the temperature of the water and the speed of the pump. The foot valve may be too small or may have become obstructed, or the foot valve or suction pipe may not be immersed deeply enough.

If the above are correct, then the most probable cause is that the impellers have become par-

tially obstructed or choked with dirt from the bilges or pipes. Other possible causes are air leaks in the suction or stuffing-boxes, defective packing or worn wearing rings.

If there is low output with abnormally high vacuum reading, the probable causes are that there is an obstruction in the suction line, such as the blind joint, choked strainer, valve or mud-box filter, or the requisite valve in the piping system has been inadvertently left closed, or others left open.

Pump loses water after starting

Check the suction lift and the temperature of the water. A leaky suction line may be suspected.

Pump vibrates

If the alignment of the pump is correct and the foundations secure, it is probable that the impeller has become partially clogged so that the balance is disturbed. There may also be mechanical faults, such as worn bearings, a bent shaft or an eroded impeller.

Pump overloads driving engine

It may be that the speed is too high, or that the pump is pumping too much water because the total dynamic head is lower than that for which the pump is rated. Check also that the liquid is of the correct specific gravity and viscosity for the rating of the pump.

OVERHAUL OF CENTRIFUGAL PUMPS

Impeller clearance

In order to keep the water under pressure in the volute from returning to the suction, the impeller of a centrifugal pump has to be fitted close to the casing. Both wear and erosion may occur and the clearances increase. In order to return to the original clearance, renewable wearing rings or bushes are fitted. The side clearance of the impeller should he checked, and if it is found to be excessive, it is time to fit new wearing rings.

The casing and impeller should be examined to see that no portion has worn unduly thin. Diffuser blades showing wear or erosion at the tips should be cut back until they are at least 2.4 mm thick at the points, and dressed to give a slightly rounded nose. Facing rings, if eroded where adjacent to diffusers, should be replaced.

Shaft

The shaft should be carefully examined, especially the stuffing-box, and if excessive wear has taken place, the quality of the packing used should be investigated and a larger amount of lubricant used while running. A temporary repair with plastic white metal tinned on can be made to a shaft worn at the stuffing-box.

Bushes and bearing

Whenever the pump casing is opened the clearance of the various bushes which prevent leakage from one element to another should be measured for excessive wear. If the bearings are worn down excessively, renewal of the bushes is necessary. They should be re-metalled and bored out.

Stuffing-boxes

As the life of the shaft depends to a very great extent on the quality and treatment of the

packing, it pays to maintain the stuffing-box in good order and to re-pack from time to time, especially where there is grit in the water. It is advantageous to run with a full stuffing-box, as by this means the intensity of pressure on the packing is reduced and consequently the frictional resistance and wear on the shaft.

In re-packing a stuffing-box, see that the packing is fitted so as to give uniform thickness all around the shaft sleeves. An excess of packing on one side of the shaft will result in deflection of the shaft and frequently in shaft breakage. In fitting new packing, the stuffing-box should be packed loosely and the gland set up lightly, allowing a liberal leakage in the case of stuffing-boxes subject to pressure above atmospheric. Then, with the pump in operation, tighten the gland in steps so as to avoid excessive heating and possible scoring of shafts or shaft sleeves.

A slight drip is necessary from the gland in order lo provide lubrication for the packing. Excessive pressure should not be applied to the glands to prevent excessive leakage. If it is found that leakage from the gland is excessive, the correct procedure is to re-pack the stuffing-box at the earliest opportunity.

New words and phrase

displacement	*n*.	移置,置换, 位移, 排水量
reciprocating	*adj*.	往复的
rotary	*adj*.	旋转的
centrifugal	*adj*.	离心的
impart	*vt*.	给予
viscosity	*n*.	黏度,黏性, 黏滞性
viscous	*adj*.	黏性的, 黏滞的, 胶黏的
vertical	*adj*.	垂直的
cavitate	*v*.	成穴,空化
marginally	*adv*.	在边上,或多或少地
irrespective	*adj*.	不顾的,不考虑的,无关的
supplant	*vt*.	排挤掉, 代替
vacua	*n*.	真空
rotor	*n*.	转子,旋转器
geometrical	*adj*.	几何学的, 几何的
vane	*n*.	叶片,轮叶
lobe	*n*.	凸角
triple	*adj*.	三倍的
idle	*adj*.	停用的
cargo	*n*.	船货,货物
tank	*n*.	舱
cam ring		凸轮环,叶片泵的定子
crescent	*adj*.	新月形的
intake	*n*.	进气口,进水口,入口

kinetic energy		动能
diffuser	*n*.	导流器,扩压器
vice versa		反之亦然
hybrid	*n*.	混合
volute	*n*.	旋涡
recess	*n*.	凹槽,凹进部分
stuffing-box	*n*.	填料函箱
choke	*v*.	窒息,哽住,使呼吸困难,阻塞
bilge	*n*.	舱底
dynamic	*adj*.	动态的
requisite	*n*.	必要的,所需要的,必需品
inadvertently	*adv*.	不注意地
erode	*n*.	侵蚀,腐蚀
bush	*n*.	衬套
unduly	*adv*.	过度地,不适当地
grit	*n*.	粗砂;*v*. 研磨
frictional	*adj*.	摩擦的,摩擦力的

Text 6 Refrigeration

The natural transfer of heat is from a hot body to a cold body, the function of a refrigeration plant is to act as a heat pump and reverse this process so that rooms can be maintained at low temperatures for the preservation of foodstuffs, or air can be cooled for the air conditioning.

The compression refrigeration is the most commonly used type of marine refrigeration. The components required for a compression refrigeration system are a compressor, condenser, liquid receiver, expansion valve and evaporator or cooling coils. In the evaporator, the liquid refrigerant vaporising, absorbs heat from the circulating brine or directly from the space to be cooled. The low pressure vapour from the evaporator passes through a heat exchanger where it cools the high temperature liquid from the condenser and in doing so becomes super-heated before being drawn into the compressor. Here, its pressure and consequently its temperature, are raised for delivery to the condenser. With any refrigerant the condensing pressure of the system is determined by the temperature of the cooling water, or of the ambient air in the case of aircooled condensers.

The most commonly used refrigerants used on ship are now probably Refrigerant 22, Refrigerant 12, Refrigerant 502 and Ammonia. Refrigerant 22 is now the most common refrigerant for a wide range of temperature, including low temperature, −41 ℃ being possible without negative evaporator pressures. Refrigerant 12 was the first of the halogenated hydrocarbon refrigerants to become widely available at sea. But because of its hazardous effect on ozonosphere, the using in refrigeration will be soon prohibited. Ammonia has never been a popular refrigerant for marine use owing to its irritant and toxic properties in the event of a leak. However, it does have cost advantages for large installations operating at low temperatures. Refrigerant 502 has many advantages over R12 and R22 and is particularly suitable for hermetic compressors, but is still an expensive

gas and not readily available worldwide at present.

DEFROSTING

In direct expansion systems, defrosting has to be effected either by separate electric heaters (in some coolers, heaters are incorporated in the cooler grids) or by providing means of bypassing the condenser, so that hot gas from the compressor goes directly to the coolers, where it condenses, giving up its latent and sensible heat to rid the cooler piping of ice. To prevent the condensed refrigerant returning as liquid to the compressor, it is necessary to re-evaporate it, either in another air cooler or a specially designed re-evaporator.

Although a large build-up of frost and snow on the cooler is undesirable and will reduce its efficiency, a slight film of frost can be beneficial, increasing as it does, the heat transfer coefficient of the cooler pipe surfaces.

CHARGING WITH REFRIGERANT

In any plant the best point at which to add refrigerant is just before the expansion valve and most large plants have a charging valve fitted at this point.

For small plants the only provision for charging may be a service valve also used for connection to a suction gauge. To charge through such a valve, the stem is first screwed out as far as possible to back seat against the gauge connection. The charging pipe from the gas bottle is loosely attached to the connection and some gas blow to purge air out of the pipe before tightening the union. The service valve is screwed inwards about 1 turn and the compressor started. When charging into the suction side of the compressor, gas bottles must be upright so that only the vapour and not liquid is drawn into the plant. For larger plant, charging into the liquid line, or after the expansion valve, a similar procedure of purging the charging pipe is necessary, but it is best to feed liquid refrigerant into the system and gas bottle should be inclined with its outlet valve at the bottom. Each bottle should be weight on a spring balance before and after charging to ascertain the weight of charge introduced.

DETECTION OF REFRIGERANT LEAKS

Regular (daily for a new plant and thereafter weekly) inspections of all components of the refrigerant circuit must be made to try to locate any leaks as soon as they arise. The quickest, but least efficient, test is to examine for traces of oil. Attention should be concentrated on compressor glands, flanges and pipe joints, particularly the flared ends of copper pipes.

A more thorough test is to paint over all joints with a soapy water solution, and look for bubbles. This is the usual method used for freon plants.

A quicker and more sensitive method for freon plants is to use a leak detector lamp. With all types of lamp, the flame is normally a pale blue or colorless and impinges on a copper plate. Traces of freon picked up by an exploring tube give the flame a pale green hue changing to violet for higher concentration.

In use the end of the exploring tube must be traversed slowly round all joints, keeping close to and preferably touching the pipe.

New words and phrase

refrigeration	*n*.	冷藏，致冷，冷却
evaporator	*n*.	蒸发器,脱水器
ambient	*adj*.	周围的
saturation	*n*.	饱和,饱和度
throttle	*n*.	节流阀,节流圈,节制
ammonia	*n*.	氨
halogenate	*vt*.	卤化
hydrocarbon	*n*.	烃，碳氢化合物
ozonosphere	*n*.	臭氧层
irritant	*n*.	刺激物；*adj*. 刺激的，有刺激性的
toxic	*adj*.	有毒的，中毒的
hermetic	*adj*.	密封的，与外界隔绝的
defrost	*vt*.	除霜
latent	*adj*.	潜在的，潜伏的，隐藏的
stem	*n*.	柄,堵住,杆
flare	*vi*.	闪光，突然烧起来，闪耀
soapy	*adj*.	像肥皂样的,肥皂质的
Freon	*n*.	氟利昂
hue	*n*.	色调,颜色，色彩
traverse	*vi*.	横越，横断

Text 7 Deck machinery

The range of deck machinery is extensive and varied, it can be divided broadly into: anchor handling (windlasses and capstans), mooring (winches and capstans), cargo handling (winches and cranes).

The basic requirement of all the above is to control loads associated with chain cable or wire rope and whilst each type of equipment has its own operational requirements, certain aspects of design and operation are common.

Most deck machinery is idle during much of its life and due to this intermittent duty requirement, gears and drives are normally designed to a limited rating of one half to one hour. Despite long periods of idleness, often in severe weather conditions, the machinery must operate immediately, when required.

DRIVE AND CONTROL ARRANGEMENTS

The two most common forms of main drive used on deck auxiliaries are electric, and hydraulic.

Electric drives are most commonly used for deck machinery. The motors are generally totally enclosed, watertight and in most cases embody a spring applied, magnetically released, fail safe disc brake.

Hydraulic drives can be broadly sub-divided into constant pressure, constant volume and vari-

able displacement systems.

Constant pressure systems for use with prime movers on deck machinery are rare, control and oil cooling problems being difficult to overcome with large equipment. In constant volume systems, as the pump delivers a constant volume of oil, speed control of the hydraulic motor is obtained by throttling the required amount of oil to the motor through a control valve, the remainder being by-passed to the pump suction. The pump discharge pressure is determined by the load, speed and direction of rotation being controlled at the hydraulic motor by a reversing lever positioning a balanced spool valve.

A third form of hydraulic drive consists of a variable displacement axial piston pump which is driven at constant speed, normally by an a.c. electric motor, and which supplies oil to a fixed displacement hydraulic motor coupled to the mechanical portion of the machinery. The piston stroke and hence the pump delivery is controlled by servo motor, the operation of which is dependent on the movement of a pilot valve in either direction from the neutral position.

It is important with all hydraulic systems to ensure that interlocking arrangements provided for pump or motor control levers are in the neutral position before the pump driving motor can be started in order to avoid inadvertent running of unmanned machinery.

ANCHOR HANDLING

The efficient working of the anchor windlass is essential to the safety of the ship. An anchor windlass can expect to fulfill the following:

1. The windlass cablelifter brakes must be able to control the running anchor and cable when the cablelifter is disconnected from the gearing during letting go.

2. The windlass must be able to heave a certain weight of cable at a specified speed. This full load duty of the windlass varies but is commonly between 4 and 6 times the weight of one anchor.

3. The braking effort obtained at the cable lifter must be at least equal to 40 per cent of the breaking strength of the cable.

Most anchor handling equipments incorporate warpends for mooring purposes. The most conventional types of equipment in use are as follows:

Mooring windlasses

This equipment is self-contained and normally one prime mover drives two cablelifters and two warpends, the latter may not be declutchable and, if so, rotate when the cablelifters are engaged. There is some variation in detail design of cable lifters and in their drives. Due to the low speed of rotation required of the cablelifter whilst heaving anchor, a high gear reduction is needed when the windlass is driven by a high speed electric or hydraulic motor. Alternatively, multisteps of spur gears are used.

Anchor capstans

With this type of equipment the driving machinery is situated below deck and the cablelifters are mounted horizontally being driven by vertical shafts.

Winch windlasses

This arrangement utilises a forward mooring winch to drive a windlass unit thus reducing the

number of prime movers required. The port and starboard units are normally interconnected, both mechanically and for power, in order to provide standby drive and to utilize the power of both winches on the windlass should this be required.

CARGO HANDLING

The duty of a deck winch is to lift and lower a load by means of a fixed rope on a barrel, or by means of whipping the load on the warp ends; to top or luff the derricks, and to warp the ship.

Derricks

Most older ships and some recent ones use winches in conjunction with derricks for working cargo. The derricks may be arranged for fixed outreach working or slewing derricks may be fitted. A fixed outreach system uses two derricks, one topped to a position over the ship's side and the other to a position over the hold. The disadvantages of the fixed outreach systems are that firstly if the outreach requires adjustment cargo work must be interrupted, and secondly the load that can be lifted is less than the safe working load of the derricks since an indirect lift is used. Moreover considerable time and manpower is required to prepare a ship for cargo working.

The main advantages of the system are that only two winches are required for each pair of derricks and it has a faster cycle time than the slewing derrick system.

The slewing derrick system has the advantages that there is no interruption in cargo work for adjustments and that cargo can be more accurately placed in the hold; however in such a system three winches are required for each derrick to hoist luff and slew.

Deck cranes

A large number of ships are fitted with deck cranes. These require less time to prepare for working cargo than derricks and have the advantage of being able to accurately place (or spot) cargo in the hold. On container ships using ports without special container handling facilities, cranes with special container handling gear are essential.

Deck cranes are required to hoist, luff and slew and separate electric or hydraulic motors will be required for each motion. Most makes of crane incorporate a rope system to effect luffing and this is commonly rove to give a level luff - in other words the cable geometry is such that the load is not lifted or lowered by the action of luffing the jib and the luffing motor need therefore only be rated to lift the jib and not the load as well.

Some cranes are mounted in pairs on a common platform which can be rotated through 360°. The cranes can be operated independently or locked together and operated as a twin-jib crane of double capacity.

New words and phrase

anchor	*n*.	锚；*v*. 抛锚，锚定
windlass	*n*.	锚机，起锚机
capstan	*n*.	绞盘
moor	*v*.	停泊，下锚，固定，系住
winch	*n*.	绞车，卷扬机

crane	*n*.	吊车,克令吊
intermittent	*adj*.	间歇的,断断续续的
eccentric	*n*.	偏心
throttle	*n*.	节流阀,节流圈,节制
spool	*n*.	线圈,绕线轴,卷轴
servo	*n*.	伺服,伺服系统
pilot	*n*.	飞行员,领航员,引航员,引导
cater for		凑合,迎合
simultaneously	*adv*.	同时地
interlocking	*adj*.	联锁的
inadvertent	*adj*.	不注意的,疏忽的
unmanned	*adj*.	无人驾驶的,无人操纵的
worm	*n*.	蜗杆,螺杆
barrel	*n*.	鼓,滚筒
port	*n*.	港口,舱门,左舷
starboard	*n*.	右舷
bevel	*n*.	斜角,折角
warp	*n*.	变形,绞船索,弯翘
stall	*v*.	(使)停转
multi-start	*adj*.	多头的
luff	*vt*.	变幅
derrick	*n*.	吊杆式起货装置
union purchase		双吊杆装置
hoist	*n*.	提升,升起
slew	*v*.	回转
tackle	*n*.	工具,滑车,辘轳
mast	*n*.	桅,桅杆
hatch	*n*.	舱口,升降口,舱口盖
outreach	*v*.	到达顶端,超越
rig	*n*.	索具装备
container	*n*.	货柜,集装箱,容器
grab	*v*.	抓
rove	*v*.	穿过(吊索套圈)
jib	*n*.	吊杆,起重臂,悬臂
platform	*n*.	平台

Text 8 Propulsors

The ship's shafting serves to transmit the rotative power from the main propulsion engine to the propulsor and also the thrust developed by the propulsor to the ship's hull. The shafting consists of several shafts rigidly attached to each other and supported in bearing resting on special

supports termed foundations.

The shafting comprises thrust shaft, intermediate shaft and propeller shaft, a section whereof passing through the stern tube is referred to as the stern tube shaft. The intermediate shaft is supported, in line-shaft bearings and the propeller shaft, by stern tube. Serving to seal off the place where the propeller shaft leaves the ship's hull, the stern tube is one of the most crucial components of the shafting. The stern-tube bearing has inserts commonly made from lignum vitae (a kind of hardwood). Also in use are rubber compound bearings and babbitt-lined bearings. They are lubricated with the outboard water. The packing gland, the stern tube is fitted with, consists of braided grease-impregnated hemp.

Main thrust bearing gives not only an axial support to the thrust shaft but also transmits the propeller thrust to the hull.

In modern motor ships the main engine may be linked to the propeller shaft either directly or indirectly. In the former case the engine shaft connects to the propeller shaft by means of a rigid or flexible coupling only. In the latter case, the recourse is to a mechanical arrangement or an electric drive. The mechanical arrangement takes the form of speed-reducing gears transmitting the engine power to the propeller shaft which rotates at a speed lower than that of the engine shaft.

STERN BEARINGS

The tail shaft is supported in a bearing of one of a number of designs. The traditional tail shaft or stem bearing was water-lubricated and consists of a number of lignum vitae staves located in longitudinal grooves in a gun-metal bush. Lignum vitae is a hard wood with quite good wear characteristics and is compatible with water. The staves in the lower part of the beating are cut so that the grain runs radially in the bearing. This gives it longer life. As an alternative to wood both Tufnol and reinforced rubber are used as stave material.

Because of alignment difficulties a single bush whitemetal bearing is often used. In this case the stern tube is not necessary and the bearing is fitted directly into the stern frame. The aftermost intermediate shaft bearing is located further aft and more or less fulfils the function that the forward stern tube bush performed in the earlier arrangement.

Sealing arrangements

There are basically three sealing arrangements used for preventing uncontrolled ingress of sea water through, or loss of oil from, the stern bearings. These are:

1. Simple stuffing boxes filled with proprietary packing material, usually rove cotton impregnated with tallow or graphite as a lubricant. In the case of high duty packing the material may be whitemetal clad.

2. Lip seals in which a number of flexible membranes are held in contact with the shaft preventing the passage of fluid along the shaft.

3. Radial face seals in which a wear-resistant face fitted radially around the shaft is in contact with similar faces fitted to the after bulkhead and to the after end of the stern-tube. A spring system is necessary to keep the two faces in contact.

Shaft bearings

The intermediate shafting between the tail shaft and main engine, gearbox, or thrust block may be supported in plain, tilting pad or roller bearings. The two former types usually have individual oil sumps, the oil being circulated by a collar and scraper device, although in some high performance ships a force-lubricated system is fitted. The individual oil sumps usually have cooling water coils, or a simple cooling water chamber, fitted. Cooling water is provided from a service main connected to a convenient sea water pump. The cooling water may pass directly overboard or be led to a bilge although the latter practice is now seldom found.

In many plain and tilting pad bearings only a bottom bearing half is provided, the top acting purely as a cover. The aftermost bearing is, however, always a hill bearing.

Roller bearings, where fitted, are grease-lubricated.

New words and phrase

rotative	*adj*.	回转的，循环的
crucial	*adj*.	至关紧要的
lignum vitae		铁梨木
hardwood	*n*.	硬木，阔叶树
braid	*v*.	编织
impregnate	*vt*.	使充满，注入，灌输
hemp	*n*.	大麻，纤维
ingeniously	*adv*.	有才能地，贤明地
staves	*n*.	杖，棍
longitudinal	*adj*.	经度的，纵向的
compatible	*adj*.	谐调的，一致的，兼容的
Tufnol	*n*.	合成树脂粘合的充有棉纸石棉等的层压塑料
reinforced rubber		补强橡胶
ingress	*n*.	进口，入口
tallow	*n*.	牛脂，动物脂；*vt*. 涂脂油于
graphite	*n*.	石墨
lip	*n*.	唇，嘴子，凸缘
membrane	*n*.	薄膜，膜，膜板
tilting pad		倾斜垫

Text 9 Propeller

The propeller consists of a boss with several blades of helicoidal attached to it. When rotated it screws through the water in much the same way as a bolt screws through its nut, and thus converts the engine torque into a direct thrust to push the ship along.

Both the fixed pitch propeller and the variable pitch propeller are used on ship. A variable pitch propeller (VPP) or controllable pitch propeller (CPP) is made up of a boss (hub) with separate blades mounted into it. An internal mechanism enables the blades to be moved to change the pitch angle.

Any screw propeller may be characterized in terms of diameter D, pitch, the number of blades, pitch ratio and efficiency.

The diameter of a propeller is that of a circle described by the tip of a propeller blade. The pitch is the distance through which the propeller advances in the course of one complete revolution in an unyielding medium. For a dimensionless expression of the pitch, P, use is made of the pitch ratio, P/D. Its value varies depending on the type of work the ship is intended to cope with. In high speed applications the pitch ratio exceeds 1.5, but smaller values are practical for towing, or trawling operations in order to obtain the highest possible propeller efficiency. This, in its turn, is the ratio of the power absorbed to produce the thrust and the power delivered to the propeller.

MATERIALS

Propeller material must be resistant to sea water corrosion and cavitation erosion; it should be capable of withstanding severe shock loading and be suitable for casting into the complex shape of a propeller, which in the case of a VLCC can weigh as much as 80 tonnes. At the same time the material should be repairable and capable of good surface finish. To allow thin blade sections - important from the point of view of increased efficiency and reduced cavitation -the material should be of high tensile strength.

MAINTENANCE

At every dry docking, propellers should be carefully examined and the slightest defect at once rectified. Similarly, any unusual vibration or noise whilst at sea should be investigated immediately and, if the cause cannot be found inboard, then the first opportunity must be taken of all under-water inspection. The expert examination and repair of propellers is a service provided by the leading manufacturers. Wherever possible, use should be made of this service because, first, it is not always easy to detect slight damage and, secondly, inexpert work call quite easily cause irreparable harm.

Cracks formed at or near blade edges, no matter how small, are potentially dangerous. If a crack should be found close to the boss (within 0.45 of the propeller radius) the makers should be consulted as any repair in this region involving heating can leave very high residual stresses which can only be removed by annealing the complete propeller. Small cracks can be temporarily stopped from spreading by drilling a hole of at least 10 mm in diameter at the extremity of the crack. The hole should then be plugged to avoid any risk of cavitation.

Damage

Damage may vary from a slight deformation, as would arise from a glancing blow on a submerged object, to severe bending or breaking away of portions of a blade, which may result from a heavy impact, such as striking a dock wall or barge. Such damage causes a disturbance of the flow of water across the blade, which may result in loss of efficiency, vibration and erosion of the metal surface. Distortion can be straightened and breakages repaired by burning or welding.

A further result of an impact may be the formation of cracks at the blade edge. Alternatively, internal stresses induced by sudden cooling after local heating may cause cracking. The effective section is thus weakened, causing overloading which, in turn, results in further growth of

the crack, with the possibility of ultimate fracture.

Corrosion

Corrosion is a chemical or electro-chemical attack on the metal surface which may be further increased if the sea-water is polluted. It causes pitting and dezincification. If severely attacked the blade's surface breaks down and becomes rough due to the partial removal of the soft corrosion product by the scouring action of the water flow across the blade, with resulting loss of efficiency and in extreme cases loss of effective section thickness. As such an attack is usually widespread, a smooth surface can be restored only by heavy grinding.

Erosion

Erosion is a mechanical attack on the metal surface which may be due to a disturbance in the flow of the water over the blade arising from damage, in which case it tends to be localized in the form of comets. Alternatively, it may be caused by cavitation or incorrect design of the blade as mentioned previously. Such an attack produces cavities, often of considerable depth, which can be repaired by welding.

METHODS OF REPAIR

Repairs which can be undertaken with the propeller on the shaft are limited to the fairing of minor edge damage and to the elimination of light corrosion and erosion by surface grinding. In no circumstances should localized heating, particularly in the form of welding, be applied in this position, as adequate stress-relieving treatment cannot be undertaken.

It is always preferable for the propeller to be returned to the manufacturers' works, where the precise extent of the damage is first determined. It is checked for pitch, any variation or bends being marked, and the edges are ground, polished and etched to assist in the detection of cracks. Brief details of the various repair processes are given below.

Straightening

The bent portion of the blade is slowly heated over a large open propane gas or coke brazier to a low red heat. The distortion is then slowly pushed back to shape by means of heavy weights placed directly on the blade. After very slow cooling, the surface is again checked for pitch and, if necessary, the process repeated.

Burning

This process consists essentially of cutting out the damaged or cracked portion of the blade, enclosing the cavity thus produced with a dried sand mould and pouring molten metal directly on to the blade edge until the whole of it is melted down and the cavity filled.

If a large portion of the tip of a blade is missing (not usually exceeding one-third of the whole), a precast section is often manufactured and then burnt on to the blade stump. Since the burn metal used is of the same composition as the propeller, abnormal corrosion (such as may be experienced with welding) does not arise in the vicinity, metallurgical examination of such burns is made, but stress-relieving treatment is not normally necessary, provided that pre-heating and subsequent slow cooling have been employed. This process provides a very satisfactory permanent repair, particularly as the mechanical properties in the region of a burn are at least equal to those

elsewhere in the propeller.

Welding

The repair of small cracks, torn edges and erosion holes is usually carried out by means of oxy-acetylene or electric-arc welding, the latter being the more satisfactory. A coated aluminium-bronze or phosphor-bronze electrode is used as it is not possible to arc-weld with manganese bronze. The affected area is first pre-heated and the actual welding carried out with great care. Afterwards the weld is annealed in order to maintain the correct micro-structure of the alloy, and to relieve the stresses induced in the metal. Failure to do this will often result in cracking under corroding conditions.

The repaired propeller is then polished, carefully checked dimensionally and statically balanced. It is finally subjected to minute dimensional and metallurgical examination.

Controllable-pitch propellers

As its name implies, it is possible to alter, at will, the pitch of this type of propeller to suit the prevailing resistance conditions. This change in pitch is effected by rotating the blade about its vertical axis, this movement usually being carried out by hydraulic or mechanical means. The most obvious application is for the double-duty vessel, such as the tug or trawler where the operating conditions when towing or running free are entirely different. Since it is usually possible to reverse the pitch completely, this type of propeller may be used with a uni-directional engine to give full ahead or astern thrust.

New words and phrase

boss	*n*.	桨毂
blade	*n*.	桨叶
helicoidal	*adj*.	螺旋形的
pitch	*n*.	间距,节距,螺距
hub	*n*.	中枢,轴毂
tow	*n*.	拖引，拖拽;*v*.拖带,拖船
trawl	*n*.	拖网；*v*.用拖网捕鱼
manganese bronze		锰青铜
supersede	*n*.	代替
rectify	*vt*.	矫正，调整
barge	*n*.	驳船
pit	*vi*.	起凹点，凹陷
dezincification	*n*.	脱锌
scour	*n*.	冲刷,冲蚀
cavitation	*n*.	汽蚀,气蚀,空蚀
comet	*n*.	彗星
etch	*n*.	浸蚀,刻蚀
propane	*n*.	丙烷
coke	*n*.	焦炭

brazier	*n*.	硬钎焊
precast	*vt*.	预浇制；*adj*. 预制的
metallurgical	*adj*.	冶金学的，冶金的
oxy-acetylene	*n*.	氧乙炔
phosphor	*n*.	磷
electrode	*n*.	电极

CHAPTER 4 ELECTRICAL EQUIPMENT (船舶电气)

PART 1 Sentences(维修用语)

Exercise 1 Failure(故障)

1. The winding's insulation resistance is close to zero.
   绕组的绝缘电阻接近零值。
2. Plenty of sparks appeared between the carbon brushes and the slip rings.
   炭刷与滑环之间出现许多火花。
3. The carbon brushes are not at their proper position.
   炭刷位置不对。
4. The motor and the compressor shafts are not well aligned.
   电动机和压缩机轴线失中。
5. One phase cable is earthed.
   一相电缆接地了。
6. The power factor is too low.
   功率因数太低。
7. The electro-magnetic winding heats because the valve has stuck in the casing.
   因为阀咬死在阀壳里,所以电磁线圈发热。
8. The motion of the thermostat is stagnant.
   恒温器的动作迟钝。
9. There is a non-through crack in the welded seam.
   在焊缝处有一个非穿透性的裂纹。
10. The contact blade is melted away.
    触头片已熔掉。
11. Where is this limit switch located?
    这个限位开关装在什么地方?
12. There are sparks at the commutator.
    换向器上有火花。
13. The insulator is aged.
    绝缘老化了。
14. The insulation is broken down.
    这个线圈的绝缘被击穿了。
15. There are plenty of burnt spots on the surface of the slip rings.

滑环表面有大量烧焦麻点。

16. There is very serious corrosion on the accumulator terminals.
蓄电池接线柱有严重腐蚀。

17. The terminal plate has become carbonized.
接线板已炭化了。

18. The contact blade is melted away.
触头片已熔掉。

19. The motion of the thermostat is stagnant.
恒温器的动作迟钝。

20. The breaker fails to trip.
开关不能跳闸。

Exercise 2 Inspection and repair(检修)

1. Check the cable for proper connection.
检查线路接线是否正确。

2. It is necessary to examine the phase sensitive circuit.
有必要马上检查一下相敏电路。

3. Dismantle the motor to check its rotor.
拆开电机检查转子。

4. Disengage the manoeuvering linkage.
脱开操纵联动机构。

5. Disconnect all the buses before dismantling the automatic air circuit breaker.
在拆下自动空气断路器之前,先把所有母线脱开。

6. Disassemble, clean and check the automatic feed water regulator.
将自动给水调节器拆开、清洁并检查。

7. Measure the values of the resistances on this printed circuit board with the universal avometer.
用万用表测量这块印刷电路板上的电阻值。

8. The insulation resistance of the generator should be kept above 0.5 megohm.
发电机的绝缘电阻应保持在 0.5 MΩ 以上。

9. The mica between the segments.
换向片之间的云母。

10. After repair, the temperature of vegetable room should be kept at 5 degree centigrade.
修理后蔬菜间的温度应保持在 5 ℃。

11. Five pieces of forty watts fluorescent lights in galley should be changed with sixty ones.
厨房里的 5 盏 40 W 的荧光灯要换成 60 W 的。

12. Dry and varnish the exciting coil.
将励磁线圈烘干并涂漆。

13. The new diode should be of the same specifications as the one broken down.
新的二极管应当和被击穿的二极管具有相同的规格。

14. The damaged windings of the transformer should be rewound.
坏了的变压器线圈应当重绕。
15. The timing of the time relay should be adjusted.
校正时间继电器的定时。
16. This transistor was broken down.
这个晶体管被击穿了。
17. The digital-to-analog.
数模转换器。
18. Please carry out the following protection test on board: no-voltage, over－load and reverse power test.
请在船上进行保护试验,包括失压、过载、逆功率试验。
19. Test the J-K trigger with the signal generator.
用信号发生器试验 J-K 触发器。
20. Don't switch on (off).
不要合上(切断)电闸。
21. The electrical apparatuses should be made dead before dismantlement.
拆卸之前,电器设备应该断电。
22. How to perform parallel operation? Is the synchronization fine or coarse?
怎样进行并车操作,是准同步还是粗同步?
23. How many storage batteries are there on board?
船上有多少蓄电池?
24. Shaft generator.
轴带发电机。
25. Renew the fuse for engine room port side light.
机舱左舷灯保险丝换新。
26. Polish the voltage regulator tap with the sand paper.
用砂纸擦光电压调节器的接头。
27. The driving motor is of watertight, three speed, pole-changing, squirrel-cage type.
驱动马达是水密、三速、变极、鼠笼型的。
28. The voltmeter is to be calibrated.
伏特表需要校准。
29. The circuit-breaker fails to close or trip.
断路器不能合闸或跳闸。
30. Load sharing and parallel operation are satisfactory.
负荷分配和并联运行令人满意。
31. Measure (the rotor) to see whether its diameter is within tolerance or not.
测量(转子),看它的直径是否在公差允许范围之内。
32. Disconnect all (the buses) before dismantling (the automatic air circuit breaker).
在拆下(自动空气断路器)之前,先把所有(母线)脱开。

33. Dry and varnish (the exciting coil).
将(励磁线圈)烘干并涂漆。

34. All the dust (in the winding) should be washed away.
(绕组内)的灰尘都应洗干净。

35. (The whole casing) should be given two coats of anticorrosive paint.
(整个外壳)应涂两遍防锈漆。

36. The damaged windings of (the transformer) should be rewound.
坏了的(变压器)线圈应当重绕。

37. (This transistor) was broken down. It should be renewed.
(这个晶体管)已经击穿,应该换新。

38. Did (these parts) pass (the shock) test?
(这些部件)做了(冲击)试验吗?

39. Please connect the shore supply.
请接通岸电。

40. Where is the shore connection box?
岸电接线箱在哪里?

41. The main generators are three-phase synchronous alternators.
主发电机为三相同步交流发电机。

42. Please make sure that the phase order connections are correct.
请肯定相序接头正确。

43. Marks must be clearly made when the wires are disconnected.
拆线时一定做出清楚标记。

44. Are the lead wires of different phases easily recognized?
不同相位的引线易于识别吗?

45. Stator coil found burnt to be rewound.
定子线圈发现已烧坏,将其重绕。

46. Check the cable for proper connections.
检查电缆接头是否良好。

47. The protection test should be carried out on board.
应在船上做保护试验。

48. No voltage test, overload test or reverse power test should be carried out.
应做失压试验、过载试验及逆功率试验。

49. The main switch should be tested by low voltage protection , reverse current protection and insulation resistance.
主开关应做低压保护试验、逆电流保护试验和绝缘电阻试验。

50. How do you do? I'm the superintend of electrical department of shipyard, and I'll check the electrical repair list with you.
你好! 我是厂方电气主管,我将要与你核对电气工程修理单。

51. Let's check the list item by item.

请按照工程修理单一项一项核对。

52. Is there any additional items?
是否有追加工程?

53. Overhauling of generator.
发电机检修。

54. How about the primary performance of the generator?
发电机原来运行情况怎样?

55. What's wrong with generator?
发电机有什么故障?

56. Is the carbon brush of generator to be renewed?
发电机炭刷是否换新?

57. Carbon ashes have accumulated in the motor, should it be cleaned?
许多炭灰沉积在马达里,是否清洁?

58. Who will supply the spare parts?
备件由谁提供?

59. Has the main switch of generator be tested by three protections?
发电机主开关是否做三项保护实验?

60. What's the problem with automatic parallel operation system?
自动并车系统有什么故障?

61. The main switch board to be cleaned.
主配电板清洁。

62. The main switch of generator to be cleaned, the contacts to be polished.
发电机主开关清洁保养、触头打磨。

63. To examine the insulation of electrical network.
电网绝缘检测。

64. The insulation of 220 V electrical network is low, please examine and repair it.
220 V 电网绝缘低,请检查、修复。

65. To calibrate the instruments of the main generator, and renew it if it's not up to the standard.
主发电机仪表校验,不合格换新。

66. Regards as the current repair of ballast pump motor, who will supply the bearing?
压载泵马达小修,轴承由谁来提供?

67. Regards as the extensive repair of the motor of steering gear, who will supply the bearing?
舵机马达大修,轴承由谁来提供?

68. What's wrong with the automatic control box of refrigerator?
冰机自控箱有什么故障?

69. How to repair the cable of the deck? Should all be renewed?
甲板电缆怎样修理? 是否全换?

70. To repair the gyrocompass.
修理陀螺罗经。

71. To calibrate the magnetic compass.
磁罗经校验。

72. Let's have a look of the exact positions of above items.
让我们看一下以上工程的具体位置。

73. The motor has been cleaned in the work shop, ready to be assembled. Please come to check.
电机在车间已经清洁干净,准备组装,请你到车间检查。

74. All the work has been finished, check it please.
这些工程已经完工,请验收。

75. This is the job order, please check and sign it, and mark with ship's stamp.
这是这次修理的完工单,请核对、签字并加盖船章。

76. Have a good voyage, see you next repair.
祝航行愉快,下次修船再见!

Exercise 3 Repair list of electric department(电气修理单)

1. The alternator (generator) be dismounted, craned/ delivered to workshop.
交流发电机拆出,吊运车间。

2. The alternator be dismantled, the stator and rotor be cleaned and checked, varnished and dried.
交流发电机解体,清洁检查、涂漆、烘干定转子。

3. The bearing be renewed with:
22228ES 1 piece (ship spare)
SKFNU234 1 piece (yard supply)
换新轴承:
22228ES 1个 (船供备件)
SKFNU234 1个 (厂供备件)

4. The collecting rings (commutator) be detached, machined/ polished/ centralized.
集电环拆离,机车加工/光车/校中。

5. The compound excitation system device be completely cleaned and check, including:
3 phases compound excitation transformer;
3 phases bridge rectifier;
3 phases harmonic vibration capacitance;
silicon-controlled rectifier;
etc.
相复励装置彻底清洁,检查,包括:
三相复励变压器;
三相桥式整流器;
三相谐振电容器;

可控硅整流器等。

6. During the inspection, we found that:

(1) The compound excitation transformer winding was loose;

(2) One phase of winding, the secondary has been broken, and connected with brass bar, temporarily, by crew;

(3) Two primer windings of 3 phase transformer, the insulation were damaged, one of them was in earthing condition, because the lock tackbolt insert through the insulation.

在检查中发现:

(1) 相复励变压器的绕组松散了;

(2) 其中一相二次绕组曾经断过,由船方人员临时以铜片接上;

(3) 两相的绝缘层破损,其中一相已接地,是因为防松脱压紧螺栓刺穿绕组绝缘层。

7. Two sets of cargo winch motors to be removed, disassembled, taken ashore, overhauled, reassembled and refitted. No. 2 cargo-hatch forward portside 26 kW three-speed squirrel-cage motor 1 set; No. 4 cargo-hatch forward portside 26 kW three-speed squirrel-cage motor 1 set.

(1) Motors to be cleaned, dried up and there insulation resistance value to be kept more than 1 MΩ;

(2) Forward and afterward bearings to be renewed;

(3) Brake linings to be renewed, 2 sets;

(4) Burnt coil to be renewed.

两台起货机电动机要拆下、解体并送上岸去检修,重新装配和安装。2 号货舱左舷前 26 kW 鼠笼式电动机一台,4 号货舱左舷前部 26 kW 三速鼠笼式电动机一台。

(1) 电动机要清洗、烘干,其绝缘电阻值要大于 1 MΩ;

(2) 前后轴承要换新;

(3) 两台制动器的刹车片要换新;

(4) 烧损的线圈要换新。

8. The compound excitation device be tested in workshop, it works normally, then fixed up to alternator.

相复励装置车间试验,正常,装配到发电机上。

9. The alternator be shifted back ship, aligned and mounted, submit to ship for acceptance.

发电机移吊回船,调整,安装,交船验收接受。

PART 2 Reading materials(阅读材料)

Repair List of Electric Department

M/S _____

1. No. 1 alternator:

Type:_____

Serial No.: _____ Manufacture: _____

Data of Manufacture: _____

No. 1 alternator to be dismounted and transported to workshop and then to be disassembled, overhauled, reassembled and refitted.

(1) Rotor and stator to be cleaned by special cleaner, dried and painted with one coat of insulating paint.

(2) Slip ring to be machined. All carbon brushes to be renewed.

(3) Bearings to be examined and renewed if any damage to be found (spares to be supplied by ship).

(4) Rust on the cooling fan of driving end to be removed and painted with one coat of paint.

(5) No. 1 alternator to be returned to vessel, remounted and recoupled in order, insulation test to be carried out together with owner and recorded.

(6) Running test without load to be carried out for 30 minutes, then 25%, 50%, 75% load running test each for one hour respectively.

Various records to be hand over to ship in triplicate.

2. The compound transformer be dismantled, 9 pcs. of coil be taken out one after another from the core. The aging insulation materials be processed, the earthing winding be repaired.

(1) Cleaned with electric cleanser, baked, sealed and hardened with epoxy to the part of earthing or short circuit.

(2) 9 pcs. of coil be wrapped with glass fiber belt, to improve the insulation.

(3) The original broken winding be welded back by silver welding, and fastened.

(4) Renewed the original input and output cable of: bridge rectifier, transformer and capacitance.

Materials:

Flexible cable	2.5 mm^2	300 mm×3 pcs.
Heat-resisting cable	2.5 mm^2	500 mm×20 pcs.
Wire holder	2.5 mm^2	6 pcs.
Epoxy plate	δ 6 mm	0.5 kg

(5) The transformer core was loose, thrusted and tightened with sunk screw and insulation pipe.

(6) The compound transformer be reassembled, dipped with insulation paint and baked, two times. And covered with anticorrosion varnish.

3. Two sets of brake coils for winch motor to be newly made as sample to supply for spare.

4. No. 1 generator air breaker handle broken on main switch board to be renewed.

5. (1) Three sets of 400 A fuses and fuse sockets on emergency switchboard to be renewed.

(2) Six pieces of spare fuse to be supplied.

General Notice

1. Unless otherwise specified, the shipyard is to furnish the necessary labours, materials and/or equipments to complete every item of repair work.

2. All workmanship and material to be of the first class quality and to be satisfaction of the owner and classification Society concerned.

3. The tender must cover and include the work herein specified as well as necessary removals, transportation, staging and accessory works connected therewith.

电气部门修理单(译文)

船名_____

1. 1号交流发电机

型号:_____

序号:_____ 制造厂:_____

制造年月:_____

1号发电机拆下送厂解体,检修,重新装配后到船上重新安装。

(1) 转子和定子用专用清洁剂清洁,烘干,并涂绝缘漆一层。

(2) 滑环光车,所有炭刷换新。

(3) 轴承检查,如有损坏换新(船供备件)。

(4) 原动机侧冷却风叶除锈,涂漆一层。

(5) 发电机送船、安装并与原动机连接就绪。会同船方作绝缘试验并作记录。

(6) 空载试运行30 min,然后再作25%,50%,75%负荷试验各1 h。

各种记录一式三份交船。

2. 将变压器解体,9组绕组逐一从铁心上取出。对老化的绝缘进行处理,接地的绕组修理:

(1) 接地或短路的绕组用电气清洁剂清洁、烘干,用环氧树脂封闭固化其接地或短路部位。

(2) 9组绕组均以玻璃纤维带绑扎包覆以提高绝缘。

(3) 原先断裂的部位以银焊焊好,固定。

(4) 旧的输入、输出电缆,包括变压器、电容和桥式整流器的电缆换新。

材料:

软电缆	2.5 mm^2	300 mm×3 pcs.
耐热电缆	2.5 mm^2	500 mm×20 pcs.
电缆接头	2.5 mm^2	6 pcs.
环氧树脂板	δ6 mm	0.5 kg

(5) 变压器铁心松散,以绝缘管和螺栓贯穿上紧。

(6) 相复励变压器组装,两度浸绝缘漆和烘干。喷防腐漆。

3. 起货机电动机的刹车线圈要照实物新绕两个,作为备件。

4. 主配电板上的1号发电机手柄破裂,要换新。

5. (1)应急配电板上的3个400 A熔断器和熔断器座要换新。

(2)供给 6 个备用熔断器。

总 注

1. 如无另外说明,船厂应提供必要的劳动力、材料和/或设备以完成各项修理工程。

2. 所有的工艺和材料的质量应是首要的,应满足船东及有关船级社的要求。

3. 报价应包括本修理单说明的工程和必要的拆装、运输、搭架以及和施工有关联的工程费用。

CHAPTER 5 SAFETY OF SHIP REPAIR
(船舶维修安全)

PART 1 Sentences(维修用语)

Exercise 1 Sentences (I)

1. Excuse me. Where is your captain?
   请问船长在哪里?
2. Our captain is over there.
   船长在那里。
3. Thank you.
   谢谢你。
4. Excuse me. Who is captain, please?
   请问哪位是船长?
5. How do you do? I am captain.
   您好,我是。
6. How do you do? I am the safety superintend of your ship, I am in charge of the safety works during repairing. This is my name card. If you have any questions regarding safety, please let me know, I hope we can cooperate very well.
   船长先生您好,我是你船安全主管,负责修船期间的安全工作。这是我的名片,如果您对安全工作有什么要求可以找我,希望我们合作愉快。
7. Pleased to meet you! I hope we can cooperate very well too.
   认识您很高兴。我也希望我们合作愉快。
8. He's the safety inspector, he's my assistant, and he can reach me if you have.
   他是安全员,我的助手,有事您可以让他通知我。
9. Can we set two smoking stations on the prow deck and stern deck?
   我们想在船舶首尾甲板处设立两个吸烟点,可以吗?
10. Yes, you can. But you need to make identifications over there.
    可以,但需要做标志。
11. If you do hot repairing works or painting works by yourself, you have to inform our ship repairing manager (SPM) in advance.
    你们需要自己动火作业和做油漆的施工请务必提前通知总管。
12. OK! We will.
    我们会的。
13. Could you write down this apparatus's (device's) name for us?

请您写下这种物品的名称好吗?

14. OK! Here you are.
好的,请收好。

15. Thank you very much.
谢谢您!

16. Can we borrow your fire hydrants?
我们是否可以借用你们的消防龙头?

17. No problem!
可以!

18. Thank you.
谢谢!

19. Could you copy the arrangement drawing of oil and water tanks for me?
请您复印一份油水舱分布图给我好吗?

20. OK! I'll arrange somebody to do it.
可以,我会安排人去做这件事的。

Exercise 2 Sentences (II)

1. Sorry, smoking is prohibited here. Please ask your crewmen to smoke at the specified points, sir.
对不起,这儿禁止吸烟。船长先生,请要求你们的船员在指定地点吸烟。

2. Sorry, I'll give notification at once.
抱歉,我马上通知下去。

3. Could you please write down the requirements about safety works? I'll try our best to satisfy the requirement.
请您把有关安全工作的要求写给我好吗?我会尽力做好的。

4. OK! Thank you.
好的,谢谢!

5. We have strict regulations for explosion measuring (oxygen measuring). Don't worry about it! I am not in charge of it, but I can send words to the related person.
我们有严格的测爆(测氧)规定,请您放心。这项工作我不是负责人,但我可以替您通知相关人员。

6. OK! Thank you.
好的,谢谢!

7. Sir, we equipped eight portable fire extinguishers and two fire hoses with your ship, their pressure kept qualified, do you satisfied with this arrangement? Both of us will be in charge of the fire-fighting work during the repairing.
船长先生,我们在本船配备了 8 具手提灭火器,两条消防水带,并且保持一定压力,您是否满意?修船期间,消防工作由我们双方负责。

8. Well done! Thank you.
很好,谢谢!

9. The following work is very important, could you arrange somebody to monitor the operation, sir?
船长先生,这项作业很重要,请您派名船员监护可以吗?
10. OK!
好的。
11. Please show me the last voyage chemicals list in the cargo holds?
请您把上一个航次舱室装载的化学品清单给我好吗?
12. OK!
好的。
13. We will start the hot repairing works in FPT, please send crewmembers to take away the cables over there!
首尖舱内动火,请派船员清理缆绳。
14. The cables have been worked off.
缆绳已经清理完了。
15. Could you tell me what oil is stored in this tank? Can you write it down for me?
请问该油舱里是什么油,写给我好吗?
16. I need to consult our chief engineer.
我得问一下我们的轮机长。
17. If you agree to start the work, please sign here.
如果您同意施工,请您在这儿签字。
18. OK!
好的。
19. Please open your materials storeroom! I have to check it up before beginning the repairing works.
请把物料间打开,作业前我需要检查。
20. OK!
好的。
21. Wearing the safety helmet(safety belt)Please! This is our safety regulation please observe it conscientiously!
请戴好安全帽(系好安全带),这是我们的安全规定,请自觉遵守!
22. OK!
好的。

Exercise 3 Sentences (III)

1. The work area of this oil bunker by hot repairing is very large and the oil needs to be cleaned up thoroughly.
这个油舱动火面积大,需要全部清油。
2. I am sorry. I need to ask for instructions from my superior before replying you.
对不起,这个问题我需要请示领导后回复您。
3. OK!

好的。

4. I have checked it up before the working, no problem with it!
作业前我已经检查过了,没问题。

5. That's OK!
好的。

6. The propeller is being worked. Don't turn the engine please!
螺旋桨正在施工,请不要盘车。

7. That's OK! I'll reform our chief engineer(second engineer).
好的,我一定告诉轮机长(大管轮)。

8. The oil-water needs to be worked off before starting with fire. Otherwise, the work can't start.
动火前机舱污油水需要清理,否则不能施工。

9. OK! I'll send somebody to do it.
好的,我派人来做。

10. No entrance to this cabin is permitted. Because it didn't pass the explosion measuring.
这个舱室暂时不能进,测爆不合格。

11. Yes, I understand.
明白了!

12. Turning on the ventilators please! Because the soot and dust concentrations are too high.
请把机舱风机打开好吗? 里面烟尘太大。

13. OK! I'll ask our chief engineer to do it.
好的,我请轮机长来做。

14. The ship's hold (cabin, tank) is just painted, it is ventilating now, I'll do explosion measuring and inform you after 4 hours.
这个舱刚喷完油漆,正在通风,四个小时后我会进行测爆,到时我会通知您的。

15. OK!
好的。

16. We haven't checked the scaffolding, wait a minute please.
脚手架还没有检验,请等一等。

17. OK!
好的。

18. The scaffolding has passed inspection, it can be used now.
脚手架已经检验合格,可以使用了。

19. Thank you, we know it.
谢谢,我们知道了。

Exercise 4 Sentences (IV)

1. Sorry, the tank(ship's hold)is under blasting, Don't work here please! Thanks for your cooperation.
对不起,舱内正在喷砂,请您不要在这儿施工,谢谢配合。

2. OK!
好的!
3. Good afternoon, Sir! The bridge is being repaired, don't whistle please!
下午好,船长先生,驾驶台上有人作业,请通知不要鸣笛!
4. That's OK!
好的!
5. We are going to repair the residential area, could you send a boatman to guard?
生活区准备施工,请派船员监护好吗?
6. OK!
好的!
7. Please open this room! The side by this room will be on hot works, the room needs to be checked.
请把这个房间打开,旁边准备动火,我需要检查。
8. OK! I fetch the key.
好的! 我去取钥匙。
9. Here is going to do hot works, the insulating layer needs to be removed.
这个地方准备动火,需要拆去保温层。
10. OK!
好的!
11. Please pour your residential waste into the green dustbin outside.
你们的生活垃圾请倒在外边的绿色垃圾斗内。
12. OK!
好的!
13. These are dangerous substance; they must be stored on land.
这些是危险品,一定要吊到船下存放。
14. OK! Please take them away the ship as quickly as possible.
好吧,赶快吊下船吧。
15. The shipyard's alarm phone number is 119; the dispatch center's phone number is 2404.
船厂的报警电话是 119,调度中心电话是 2404。
16. Wait a minute! I need to write them down.
等一下,我得记下来。
17. Today, No.3 starboard will do hot works, No.4 port will be painted.
今天右 3 舱动火,左 4 舱喷漆。
18. OK!
好的!
19. Open the door of oil tank please!
请把油舱道门打开。
20. OK!

好的!

Exercise 5 Sentences (V)

1. We have arranged full-time people to guard the area where hot work is done, and have prepared fire pumps or fire extinguishers.
   我们动火区域都有专人看火,并且准备了消防水泵或灭火器。
2. Well done!
   很好!
3. How much oil stored in this tank? Draw a sketch for me please!
   这个油舱有多少油? 请画图给我。
4. OK!
   好的!
5. Where does this pipe lead? Draw a sketch for me please!
   这根管通向哪里? 请画图给我。
6. Here you are!
   好的!
7. Have the dry partition tank loaded cargoes? What are the cargoes? Write the cargoes' names for me please!
   干隔舱装过货物吗? 是什么? 请写给我。
8. Here you are!
   好的!
9. Sir, oil spillages are observed around your ship, make a tour of your ship please!
   船长,你们船附近海面漏油了,请检查一下是否有泄漏处。
10. OK!
    好的!
11. Tighten the cables please! The ship has gone away too far from the port; it is dangerous to go along the accommodation ladder.
    请派人紧缆绳,船已经离码头很远了,登船梯很危险.
12 OK! I'll send somebody to do it at once.
   好的! 我马上派人去做。
13. Is the CO_2 fire extinguishing system of your ship effective?
    船上的 CO_2 灭火系统是否可用?
14. Yes, it's. We have checked it justly.
    是有效的,我们刚刚检查过。
15. Sorry, It's 4 clock p.m. I have a meeting; I have to go ashore at once. I'll call on you when I come back.
    对不起,下午 4 点了,我马上下去开会,回来我会找您。
16. OK!
    好的!

17. The ladder in this hold has been cut off. Don't go down here please!
大舱梯子已割掉请不要从这儿下去。

18 OK!
好的!

19. This is the explosion measuring data of this tank, here you are.
这是舱室的测爆数据,给您。

20. Thank you!
谢谢!

Exercise 6 Sentences (VI)

1. The oil in the tank has to be transferred firstly, then clear out the oil, and after that the hull's armor plate can be replaced lastly.
油舱必须驳油,清油后才能换板。

2. OK!
好的!

3. The repairing work is not allowed to begin unless measures being taken to protect this cable.
我们需要对这根电缆进行防护才能允许施工。

4. I think so also.
我也这么认为。

5. Be careful! The deck is very slippery.
甲板很滑请小心。

6. Thanks for reminding us of it!
谢谢提醒!

7. The hatch needs to be opened further more, otherwise, the ventilation is not good.
舱盖需要再打开一些,否则通风不好。

8. OK!
好的!

9. Maybe there is typhoon tonight, please add cables and send somebody on duty!
今晚可能有台风,请加缆绳并派人值班。

10. OK!
好的!

11. May I use your electric torch?
我可以用您的手电吗?

12. Here you are!
给!

13. Thank you! Somebody wounded on board, please lend us your first aid kit!
谢谢!船上有人受伤,请借用一下急救箱。

14. I'll fetch it for you at once.
我马上去取!

15. Can these barrels be lifted off? They block the passage.
请问这些油桶是否可以吊走？它们阻碍通道了。
16. Yes, you can.
可以吊走。
17. Is this the tank's louvered air outlet?
请问这个是油舱透气帽吗？
18. Yes, It is.
是的。
19. Where is the engine room entrance?
请问机舱入口在哪？
20. The entrance is over there.
入口在那！

Exercise 7 Sentences (VII)

1. Here is being repaired, no thoroughfare! Walking along there please!
这里正在施工,禁止通行,请走那边。
2. OK!
好的！
3. Excuse me, sir! You need to clear the place where you just worked.
打扰,先生,现在需要你们把刚才施工的地方清理一下。
4. OK!
好的！
5. I'm sorry! My English is poor. If you have any ideas about this ship's safety work, write them down for me. I'll get them well done in after days.
对不起,我的英语不太好。您对本船的安全工作有什么意见,请写下来给我,我以后会尽力做好。
6. OK!
好的！
7. May I help you?
您需要帮助吗？
8. No, thank you.
不,谢谢！
9. I'm very happy to work together with you; I hope to cooperate with you next time.
和您配合非常愉快,希望有机会下次合作。
10. So do I!
我也有同感。
11. Glad to meet you! May I help you?
你好！见到你很高兴,有事吗？
12. Yes, I have something needing your help.
是的,有件事需要您帮忙。

13. Welcome to our company(repairing ship)!.
欢迎您来我们公司修船。

PART 2 Reading materials(阅读材料)

Text 1 Enclosed space entry permit(进入封闭舱室的检查与许可)

Item by authorizing officer/engineer	Precautions/Questions to be taken/answered	Checked by authorized person
01. ( )	Space thoroughly ventilated and arrangement has been made for continuous ventilation during occupancy of the space and at interval during breaks	( )
02. ( )	Atmosphere tested and found safe for entry & safe for work (e.g. hot work)	( )
03. ( )	Rescue and resuscitation equipment available at entrance	( )
04. ( )	Responsible person in constant attendance at entrance & realized the duties	( )
05. ( )	Means of communication made between person at entrance & those entering	( )
06. ( )	Are access and illumination adequate	( )
07. ( )	All portable lights and equipment to be used are of approved type	( )
08. ( )	Is breathing apparatus to be used? ( ) Yes, ( ) No	( )
09. ( )	Familiarity of user with breathing apparatus is confirmed	( )
10. ( )	Breathing apparatus has been tested (gauge & capacity of air supply, low pressure audible alarm; face mask - air supply & tightness) & found to be satisfactory	( )
11. ( )	Has the means of communication been tested and emergency signals agreed	( )
12. ( )	Has the duties & safety precautions been well explained and understood	( )
13. ( )	Has master/ch. engineer & deck/engineer been informed of the entry	( )
14. ( )	Have first aid preparedness/medical attendance necessary & being arranged	( )
15. ( )	Has tags attached to relevant controls or equipment	( )

Certificate of checks

I am satisfied that all precautions have been taken and that safety arrangements will be maintained for the duration of the work

Authorized person in charge : Signed _____

Time/Date: _____

Certification of completion

The work has been completed and all persons under my supervision, materials and equipment have been withdrawn

Authorizing Officer in charge: Signed _____ Time/Date: _____

Text 2 Engine & equipment repair work permit (机械设备维修工作的许可)

Item by authorizing engineer	Precautions/Questions to be taken/answered	Checked by authorized person
01. ( )	Have master & deck been informed the engine/equipment repair work	( )
02. ( )	Did the engine is stopped, pressure has been relieved, isolated from sources of power or heat and / or the equipment fuses been removed & locked	( )
03. ( )	Has all relevant personnel been informed and a 'DO NOT START: MAN WORKING INSIDE THE ENGINE' tag or similar notice been attached to the control stand of the engine/equipment	( )
04. ( )	Has the engine/equipment been cooled down and ventilation is applied	( )
05. ( )	Did the No Smoking signs been displayed near the engine/equipment	( )
06. ( )	Have suitable protective gears been taken by all workers	( )
07. ( )	Warn workers never enter or remain in remote type or an unmanned machinery space alone. Only enter as instructed by the designated engineer in charge	( )
08. ( )	Did the working area adequately illuminated	( )
09. ( )	Have proper working tools been prepared and ready at hand	( )
10. ( )	Did the engine/equipment properly cleaned up of oil, grease, fuel etc.	( )
11. ( )	Whether fire precaution measure is taken	( )
12. ( )	Has responsible person in constant attendance at area & understood the duties	( )
13. ( )	Whether breathing apparatus is required and readily condition checked	( )

Certificate of checks

I am satisfied that all precautions have been taken and that safety arrangements will be maintained for the duration of the work

Authorized person in charge: Signed _____ Time/Date: _____

Certification of completion

The work has been completed and all persons under my supervision, materials and equipment have been withdrawn

Chief engineer/Engineer in charge: Signed _____ Time/Date: _____

Text 3 Electrical repair work checklist(电气设备维修检查单)

Item by authorizing officer/engineer	Precautions/Questions to be taken & answered	Checked by authorised person
01. ( )	Whether the authorized person is a competent person with sufficient technical knowledge to carry out the work	( )
02. ( )	Have the Deck / Engineer & Engineer in charge been informed before work	( )
03. ( )	Whether de-energize of such equipment is carried out & fuses are removed or circuit breakers are opened to ensure that all related circuits are dead	( )
04. ( )	Did such equipment & circuits are properly tagged with warning sign "Danger: Under Repaired" & locked in to avoid inadvertent use	( )
05. ( )	Has double check been carried out that any interlocks or other safety devices are operative	( )
06. ( )	Additional precautions being taken to ensure safety for work on high voltage equipment	( )
07. ( )	Has work area been checked that well ventilated and well protected of wet	( )
08. ( )	Whether adequate isolating clothing and tools are used for the work, and a dry insulating mat to be used at all times	( )
09. ( )	Do person know how to immediately de-energize appropriate equipment and the responding of electrical shock is always in attendance	( )
10. ( )	Has proper fire extinguisher for electrical fire ready at hand	( )
		( )

Certificate of checks

I am satisfied that all precautions have been taken and that safety arrangements will be maintained for the duration of the work

Authorized person in charge: Signed _____ Time/Date: _____

Certification of completion

The work has been completed and all persons under my supervision, materials and equipment have been withdrawn

Chief Engineer: Signed _____ Time/Date: _____

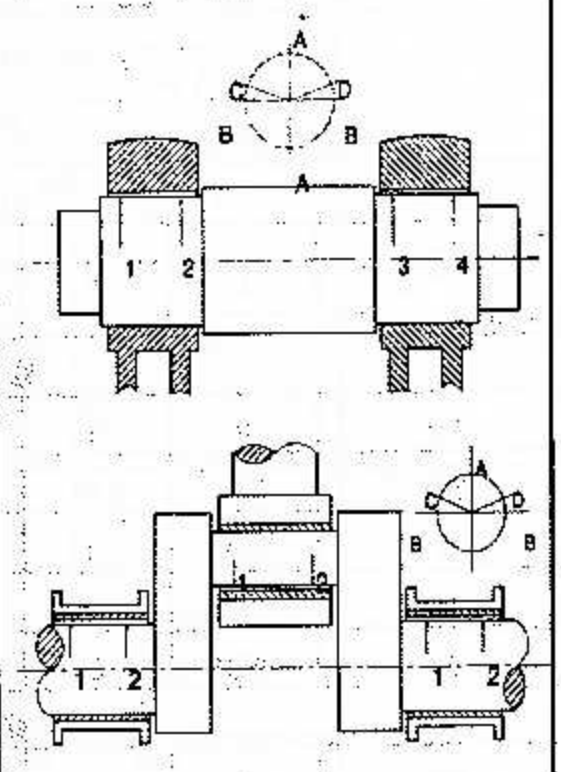
CHAPTER 6 APPLICATION EXAMPLES
(修船英语实例)

PART 1 Inspection and repairing report(检修、检验报告)

Example 1 Checking of main bearing, crank pin & crosshead bearing of M/E

INSPECTION REPORT

缸号/Cyl.No. / 项目/Item		1	2	3	4	5	6	7	8
曲柄销径/Crank Pin Dia. Φ= (mm)									
1	A	-	-	-	-	-	-	-	-
	B	-	-	-	-	-	-	-	-
2	A	-	-	-	-	-	-	-	-
	B	-	-	-	-	-	-	-	-
曲柄销轴承间隙/Crank Pin Clearance									
1	A				0.28		0.26		
	C				0.20		0.19		
	D				0.19		0.18		
2	A				0.28		0.26		
	C				0.19		0.18		
	D				0.19		0.18		
主轴径/Main Journal Dia. Φ= (mm)									
1	A	-	-	-	-	-	-	-	-
	B	-	-	-	-	-	-	-	-
2	A	-	-	-	-	-	-	-	-
	B	-	-	-	-	-	-	-	-
主轴承间隙/Main journal bearing clearance (mm)									
1	A							0.28	
	C							0.19	
	D							0.20	
2	A							0.27	
	C							0.20	
	D							0.20	
十字头轴承间隙/Crosshead bearing clearance (mm)									
1	A				0.26				
	C				0.19				
	D				0.19				
2	A				0.26				
	C				0.20				
	D				0.20				
3	A				0.26				
	C				0.19				
	D				0.19				
4	A				0.26				
	C				0.20				
	D				0.20				
十字头直径/Crosshead Dia. Φ= (mm)									
1	A								
	B								
2	A								
	B								
3	A								
	B								
4	A								
	B								



Unit: mm

Remarks:

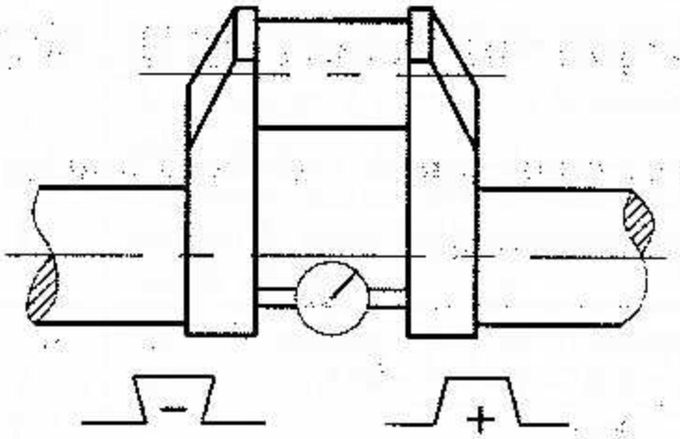
推力轴承间隙是 x mm (The thrust bearing clearance is x mm)

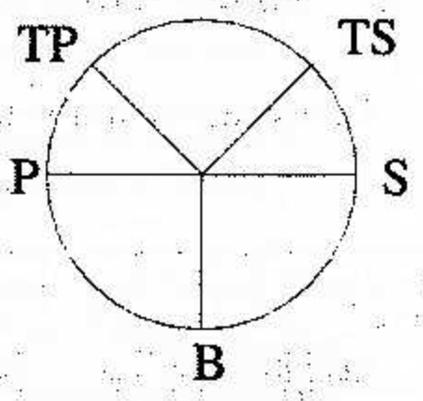
Measurer: _____ Inspector: _____

Example 2 Measurement of crank deflection of M/E(主机曲轴臂距差的检测)

INSPECTION REPORT

首端 (FREE END)No.1 至 (TO)尾端 (FLYWHEEL END)





Cyl. No. / Point	1	2	3	4	5	6	7	8	9	10
修理前或坞前（Before repairing or docking）										
TP	0	0	0	0	0	0				
TS	−0.01	0.01	0	0	−0.02	0.02				
S	−0.03	0	0.04	−0.03	−0.08	0.01				
B	−0.03	0	0.09	0.01	−0.07	0.05				
P	−0.01	0	0.04	0.01	−0.04	0.03				
修理后或坞后（After repairing or docking）										
TP	0	0	0	0	0	0				
TS	0	0.01	0.02	0	0	0				
S	−0.07	0	0.04	−0.02	−0.05	0.01				
B	−0.02	0	0.07	0.02	−0.06	0.04				
P	−0.01	0	0.04	0.01	−0.04	0.02				

Remarks:

Measurer: _____ Inspector: _____

Example 3 Record of sealing test (密封试验记录)

INSPECTION REPORT

Part Name 部件名称	Quantity 数量	Testing Medium 试验介质	Testing Pressure 试验压力/MPa	Time For Testing 试验时间/min	Testing Date 试验日期
Test for heat exchanger (热交换器试验)					
造水机冷凝器	1台	水	0.2	10	2003/8/24
主机空冷器	2台	水	0.4	10	2003/8/20
Test for valve (阀件试验)					
Safety valve of auxiliary boiler		Nitrogen	Relief:0.90 Shut:0.88		
Safety valve of auxiliary boiler		Nitrogen	Relief:0.92 Shut:0.90		
Safety valve of exhaust gas boiler		Nitrogen	Relief:1.15 Shut:1.08		
Safety valve of exhaust gas boiler (spare one valve)		Nitrogen	Relief:1.15 Shut:1.08		
Safety valve on steam pipe		Nitrogen	Relief:0.49 Shut:0.45		
Safety valve of air bottle		Nitrogen	Relief:2.75 Shut:2.60		
		Steam	Relief:0.90 Shut:0.85		
Safety valve of auxiliary boiler		Steam	Relief:0.90 Shut:0.85		
Safety valve of N_2 system in N_2 room		Nitrogen	Relief:0.35 Shut:0.32		

备 注(Remarks):

以上各检修项目经检验均无漏泄,达到使用要求,准予离厂

All the repairing works above have been found no leaking or in good order by inspector's checking, and allowed departing from our shipyard

检测人: 核 检:

Measurer: _____ Inspector: _____

PART 2 Representative repairing process(典型修理工艺)

Example 1 Ship engine overhaul workmanship(轮机检修工艺)

1. Before dismantling, measure the deflection and record it.
   在拆解前测量臂距差并记录。
2. Remove upper department of the bed plate in turn, make mark as remembering.
   按顺序拆除机座以上部件,做好标志。
3. Draw out crank shaft, put it on the special cradle, clean it and make flaws detection and do necessary check.
   吊出曲轴,将之放置于专用支架上,清洁,探伤,并作必要的检查。
4. Measure main shaft, crankshaft, thrust shaft diameter and record it.
   测量主轴径、曲柄轴径、推力轴径等并作记录。
5. Remove bed plate and check base plate upper surface, if the clearance is more than 0.10 mm, grind upper surface till the clearance being less than 0.10 mm.
   移走底座,检查基座上平面,如果间隙超过 0.10 mm,磨削上平面直到用 0.10 mm 塞尺检查不入。
6. Put new bed plate on base plate, use feeler to check touching surface, it should be less than 0.10 mm.
   将新机座置于基座上,用塞尺检查接触面,应 0.10 mm 塞尺不入。
7. Ream bolt holes (more than 2 pcs.), tighten bed plate and base plate together, check upper surface and main shaft bearing hold; and record it, total difference should be less than 0.10 mm.
   铰螺栓孔(不少于 2 个),将机座与基座把紧,检查机座上平面和主轴承孔,并作记录,总差数应不大于 0.10 mm。
8. Tighten main bearing's upper shell, measure inside diameter and record it.
   把紧主轴承上瓦壳,测量内径并作记录。
9. Paint a thin red color oil on lower main bearing shell surface; then put lower bush on it and move left to right slowly, then check touching area, it should be more than 75%.
   在主轴承座孔内涂上薄薄的一层红油,将下瓦放在座孔内来回摆动,取出后检查瓦背接触面积,应大于 75%。
10. Install back crankshaft, use feeler to check bearing clearance between 90°~120° angles, it should be less than 0.05 mm.
    将曲轴装入,用塞尺检查主轴颈与下瓦的接触情况,在 90°~120°范围内应 0.05 mm 塞尺不入。
11. Use lead wire to check main bearing clearance, it should be between 0.110 mm to 0.195 mm, the max. clearance is 0.35 mm.
    用压铅法检查主轴承,间隙应在 0.110 mm 到 0.195 mm 之内,最大不超过 0.35 mm。

12. Measure deflection, it should be less than 0.03 mm, and after installing fly-wheel, it should be less than 0.05 mm.
测量臂距差,应小于 0.03 mm,安装飞轮后应小于 0.05 mm。

13. Use sealing paste on bad plate surface, paste type is 7304.
机座结合面涂 7304 密封胶。

14. Install back old frame, check fore and aft side faces, the difference between frame and bed plate should be less than 0.05 mm, difference of right and left side should be less than 0.10 mm.
装上旧机架,检查机架与机座前后、左右对齐情况,在前后方向上应不大于 0.05 mm,在左右方向上应不大于 0.10 mm。

15. Ream bolt holes (more than 2 pcs.), tighten the frame and bed plate together, the clearance of touching surface should be less than 0.10 mm.
铰螺栓孔(不少于 2 个),将机架与机座把紧,用塞尺检查应 0.10 mm 不入。

16. Install back piston without piston ring, turn crankshaft and use light to check clearance between piston and cylinder wall while crankpin locating on 0°, 90°, 180°, 270° position, the light should be seen on opposite (the ship should ballast at horizontal position).
在不带活塞环的情况下将活塞装入,将曲柄销盘到 0°,90°,180°,270°四个位置,分别用灯光检查,均应透光(此时船应在水平位置)。

17. Regulate connection rod to ensure the forth side clearance between piston pin and cylinder as follow:

No.1, 2	No.3, 4	No.5, 6	No.7, 8	No.9, 10	No.11, 12	No.13, 14	No.15, 16
1.76	1.54	1.32	1.10	0.88	0.66	0.44	0.22

调整连杆位置,保证活塞销轴前侧面与缸套的间隙如下:

No.1, 2	No.3, 4	No.5, 6	No.7, 8	No.9, 10	No.11, 12	No.13, 14	No.15, 16
1.76	1.54	1.32	1.10	0.88	0.66	0.44	0.22

18. Measure crank pin shaft diameter and its bearing clearance, the clearance should be between 0.08 mm and 0.165 mm, the max. clearance is 0.35 mm.
测曲柄销颈及连杆大端孔间隙,此间隙应在 0.08~0.165 mm 范围内,最大0.35 mm。

19. Install back other parts and align electric machine with diesel engine crankshaft center line as follow:
回装其他附件,电机与发动机轴线找正,步骤如下:

(1) Ream bolt hole and tighten electric machine with diesel engine shaft coupling together.
将靠背轮螺栓孔重新铰制,配螺栓,将发电机与柴油机靠背轮及飞轮把在一起。

(2) Put deflection gauge on No. 8 cylinder, and then turn the crankshaft and check

gauge data change.
将拐档表置于第八拐档,盘车检查拐档值变化量。

(3) Adjust electric machine's position to let the deflection change within the range of 0～0.05 mm, at the same time, use feeler to check the clearance between electric machine rotor and stator, it should be equal all around.
调整发电机,使臂距差在0～0.05 mm范围内,同时检查电机转子与定子的间隙,应四面相同。

(4) After aligning, tighten electric machine foundation bolts, and then measure each deflection again and record it, it should be within 0～0.05 mm.
调整后,把紧电机地脚螺栓,测各拐档的臂距差并记录,臂距应在0～0.05 mm范围内。

20. Other parts' clearance and inlet exhaust valve timing and torques of the nuts should be based on the instruction book.
其他部分的间隙及进、排气阀定时,螺栓预紧力矩等根据说明书的要求进行调整。

Example 2 The disassembling procedure of M/E crankshaft renewed(主机换曲轴工艺)

Most parts of the crankshaft have been disassembled by ship owner's peoples. Other work will be done by shipyard. It should be carried out as following:
该船主机曲轴的大部分零件已被船方带来的技工分解,余下部分由船厂进行工作。

1. A "工" shaped frame should be mounted on the top of the engine room in order to lift the engine frame and crankshaft, with 4 chain locks (10 tons each) being prepared.
在机舱上部架上"工"字型钢体,以备吊机架及曲轴用,并准备10 t葫芦4个。

2. Disassemble 2 sets of turbochargers, shift out of engine room, related parts should be disassembled.
分解增压器2台,吊出机舱,有关上部牵连工程分解。

3. Turn the gear to check the injection time. Turn No.1 crankpin to TDC (Top Dead Center). Check the working condition of the gear.
盘车检查定时,将No.1曲柄销盘到上止点(由输出端向前看左侧第一号缸),检查传动齿轮的啮合码号。

4. Disassemble the bolts between engine frame and casing, frame and oil tank.
分解机架与本体座螺栓及机架与油箱的倒装螺栓。

5. Disassemble the forward vibration absorber of crankshaft, shift it out of engine room, put crankshaft on 3 pcs. wood (each size: 150 mm×150 mm×1 500 mm).
分解曲轴首端减振器并吊出机舱,将曲轴放在3个木墩上(木墩尺寸150 mm×150 mm×1 500 mm)。

6. Lift up the engine frame, move toward port side 1 200 mm, and put it on 3 pcs. wood (each size: 150 mm×150 mm×1 500 mm).
吊起机架,向左移1 200 mm,放在已垫好的3个木墩上(木墩尺寸150 mm×150 mm×

1 500 mm)。

7. Fabricate a new frame, and put crankshaft on it, fix 3 pcs. top covers, prepare 2 pcs. chain lock (1 ton each). Hold the shaft to prevent the shaft from moving fore and aft side. Then shift the crankshaft out of engine room.
新做放置曲轴的架子一个,将曲轴放在架子上,并安装上3个上盖,用1 t葫芦2个,拉紧曲轴,防止它前后串动,将曲轴吊出机舱。

8. Turn the engine frame 90°, check the parallelism and concentricity between engine frame and main bearing working surface by 3 m flat ruler, present the results to ship owner. The ship owner will determine what to do next.
原地将机架转90°,用3 m长平尺测量机架上主轴承接合面之平行度及中心度,测量结果交船方,由船方来决定下步的工程进程。

Example 3 The welding procedure of M/E chain gear box crack (主机链条箱裂纹补焊工艺)

1. Clean, remove oil, prepare for hot-working, and in the meantime prevent the parts in the chain from any slug, dirty etc.
清洁,除油,做好动火作业前的准备工作,同时做好防护工作,防止异物及渣子落入链条箱内。

2. Determine the extent of crack, eliminate the crack thoroughly and make 60° "V" type slope for welding.
仔细检查裂纹,确定裂纹长度及范围,清除裂纹,并打磨出60°"V"型坡口,准备焊接。

3. Preheat to 150 ℃, and maintain the temperature at 100 ℃ before welding (If the thickness of the plate over 40 mm).
焊前预热至150 ℃,并保持100 ℃(如果钢板厚度大于40 mm)。

4. Grind between each weld layer, remove the stress by tapping.
每层焊完后,需打磨,并用敲击法消除内应力。

5. Select low hydrogen welding rod, e.g. J507 A3.2.
选用低氢焊条,如J507 A3.2。

6. Baking the welding rod at 350 ℃ for an hour before welding, and then counter-connect the electrode, adjust weld ampere between 120~150 ampere.
焊前焊条烘干,350 ℃ 1小时,反接焊极,施焊电流120~150 A。

7. Flaw inspection should be carried out after welding.
焊后进行探伤检查。

Example 4 M/E frame box repairing workmanship (主机机架修理方案)

If the frame has been found deformed seriously, the repairing method should be as follow:
如经检查后发现机架变形,则采用如下方法进行修理:

1. Frame upper surface:
机架上表面:

(1) Turn the frame upside-down and make the mating surface upward.

将机架翻转,接合面朝上。

(2) If the distortion is small, we can use wind power sand - wheel to grind it; if the distortion is too big, the frame must be transformed to workshop and finished on planning machine. Planeness should be less than 0.10 mm per 1 000 square millimeter and less than 0.15 mm in the total surface.

在变形很小的情况下,用风动砂轮手工研磨;如变形较大,则吊运出舱,上刨床将接合面刨平,达到每 1 000 mm^2 内不大于 0.10 mm,全表面内不大于0.15 mm。

2. Bearing holes:

瓦孔:

(1) If the plane "c" is over limit, recover the original size by means of brush-plating and grinding.

如果 c 面超差,则用刷镀研磨的方法恢复原尺寸。

(2) If the plane "a" is over limit, repairing it by means of sand-wheel and grinding, ensuring the fitting clearance to be less than 0.05 mm.

如果 a 面超差,用手工研磨的方法达到 0.05 mm 塞尺不入的要求。

(3) Tighten up the bearing seat, re-measure inner diameter again, we can choose two ways to repair it.

If distortion is small, use brush - plating and grinding to repair it.

If distortion is too big, bore the bearing hole and replace with thicker bearing.

将瓦座把紧,重新测量瓦孔内径,根据变形情况采用电刷镀、研磨或直接上装配机镗孔换加厚瓦的方法来恢复。

3. Install crankshaft and piston according to assembling procedure.

曲轴、活塞组装按组装工艺要求进行。

Example 5 M/E frame box checking & assembling requirements(主机机架检查组装要求)

Because lubricating system was out of operation, main bearings were burnt. Main engine frame box maybe have deformed. It should be checked as following:

该机因出现缺油故障,主轴承烧坏,机架可能变形,按如下要求进行检查:

1. Frame casing checking:

Use 3 m flat ruler to do the following checks:

a) Bottom side surface of the frame (the deflection of bottom can't exceed 0.15 mm along the bottom surface).

b) Height difference of the adjacent conjunct surface between bottom bearing and engine frame should not exceed 0.04 mm, total not exceed 0.15 mm.

机架本体检查:

用 3 m 长平尺进行如下项目的检查。

a)机架下平面,全长范围内不超过 0.15 mm。

b)下轴承壳接合面,两座相邻差不超过 0.04 mm,全长不超过 0.15 mm。

2. Bottom main bearing checking:

a) Check surface A on platform, 0.05 mm feeler can not be plugged in.

b) Measure clearance between surface B and engine frame, it should not exceed 0.2 mm, clearance between surface C and frame casing should not exceed 0.135 mm.

c) Check D and E's size, their difference should not exceed 0.04 mm each.

d) Fix the bearing casing with the frame, check the inside diameter of the holes, their cylindricity should not exceed 0.035 mm.

下轴承壳的检查:

a)A 面放在平台上检查,0.05 mm 塞尺不入。

b)测量 B 面尺寸与机架配合总间隙,不得超过 0.2 mm;C 面与本体间隙不超过 0.135 mm。

c)测量 D,E 尺寸,每块之差不超过 0.04 mm。

d)轴承本体壳与机架把在一起,测量每孔尺寸,每孔圆柱度不超过 0.035 mm。

3. If the results are out of range, other repairing procedure should be carried out, otherwise, present the results to ship owner and surveyor.

上述测量结果如超差,另行决定修理方案;如在范围内,修理后交船方及验船师检查验收。

4. Crankshaft assembling:

Assemble each set of main bearing, check inside diameter, if within the range, then disassemble again. Assemble the bottom side bearing with the crankshaft, check its working condition and make necessary adjustment. Check the deflection, the deflection should not exceed 0.06 mm, and present the results to ship owner and surveyor.

曲轴组装:

将每组主轴承组装,测量内孔尺寸,符合要求后再分解。单独将下部轴承组装,检查轴承与主轴颈配合面的着色情况,如有个别不吃色的可调整轴承座来达到着色要求,并测臂距差尺寸,不得超过 0.06 mm,交船方及验船师检查验收。

5. Piston system assembling:

Make center line check for the piston in the cylinder without piston ring. Only check fore & aft side by light. If no light, turn it by special screw rod. If piston does not return automatically, it's eligible, and then presents the results to ship owner and surveyor.

活塞装置组装:

将不带环的活塞装置在缸内盘车找正,只检查前后方向,用透光法检查,如前后有零位的,用撬杠拨动,不自动返回为合格,交船东和验船师检查验收。

Notes: clearance of each part and fixing torque should be in accordance with instruction manual.

注:各部位间隙表及螺丝把紧力矩有关数据,应符合说明书的要求。

Example 6 The building-up weld procedure for hydraulic steering shaft (液压舵机推力轴拉痕堆焊工艺)

Shaft material:35# steel

Operation of welding:CO_2 arc welding

Welding rod: CW-50

Type: ø1.6 mm

Welding machine:AC/DC negro welding machine (SW-300)

Welding program:

1. Clean and chip the welding area by light grind until naked by metal shine.
2. Pre-heated to 200 ℃.
3. Welding figures

Electric current/A	Voltage/V	Welding speed/(mm·min^{-1})
60～70	11～13	60～80

4. After welding keep temperature by slowly cooling down.
5. Welding seam grind and PT test.
6. The normal distortion caused by welding is less than 0.02～0.05 mm, keep the chromium layer remaining during welding, and mind it away after all works being finished, do away the original chromium plating layer, then plate chromium, and grind out the size according to the designed paper.

Above are the parts of the shaft's repairing procedure.

推力轴母材：35#钢

焊接方法：CO_2 保护焊

焊材、牌号:CW-50

规格：ø1.6 mm

焊接设备：交直流氩弧焊机(SW-300)

焊接工艺：

1. 清洁缺陷部位。
2. 局部预热 200 ℃。
3. 焊接参数

电流/A	电压/V	速度/(mm·min^{-1})
60～70	11～13	60～80

4. 焊后处理:焊接部位保温缓冷至室温。
5. 焊道打磨,着色检验。
6. 焊接引起正常变形不超过 0.02～0.05 mm,焊接时保存铬层,完工后磨削去。除旧铬层,重新镀铬层,照图纸尺寸打磨。

本工艺是修复此轴的部分工序。

Example 7 Exhaust gas boiler steam coil pipe renewing workmanship (废气锅炉盘管换新工艺)

1. Dismantle and install coil pipe.
盘管拆装:

(1) Dismantle the connected pipes and valves from the body, remove protection coat and insulation coat, and clean inside.
拆除与炉体连接的管件、阀件,将炉外衣及绝缘层剥除,清扫干净。

(2) Use cutting torch to separate coil pipe from coil box, grind purely around pipe connection holes about 20 mm rang and make welding groove.
沿盘管根部用气割将之与联箱分开,联箱管孔周围 20 mm 范围内打磨干净,并倒焊接坡口。

(3) The brace and stiffening rib should be checked and repaired according to condition.
炉内的盘管牵条及加强筋视情况修换。

(4) Transfer the old coil tubes to workshop and fabricate new coil tubes according to samples and drawings supplied by ship owner. Each coil tube should be hydraulically tested after fabrication.
将旧盘管运回车间按旧样及船方提供的图纸制作。每盘盘管制作后进行水压试验,检验焊接处。

(5) Carry the new coil tubes on board, weld the tubes to the manifold by hand welding (welding groove is shown in the following Fig. 6.1).
将新盘管运回船上安装,盘管与联箱接口处焊接时采用手工焊接,形式如图 Fig. 6.1所示:

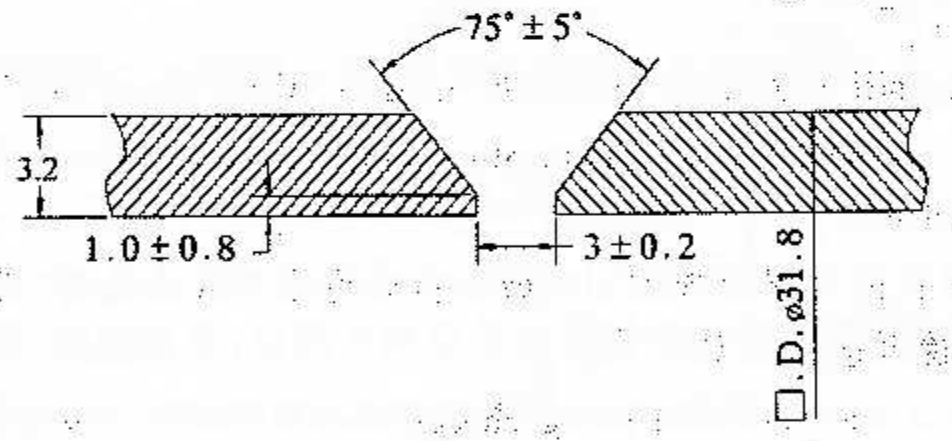


Fig. 6.1

(6) Do pressure test (the pressure is 0.98 MPa, and it should not have leakage in 30 min).
做压力试验 0.98 MPa,30 分钟不漏。

(7) Install back insulation coat and pipes valves.
恢复绝缘外衣及管路、阀件。

2. Fabricate coil tube.
盘管制作:

(1) Fabricate the coil tubes and attachments according to old sample and ship owner's drawing.

按船供图纸及旧样制作管路及附件。

(2) The fabricating coil tubes group must be inspected on flat plate, the requirements are as following:

盘管制作成后按旧样及图纸在平台上检验盘管组,要求如下:

①The steel tube around the welding bead (in the range of 20 mm) should be grind to naked.

管头对焊处 20 mm 范围内打磨干净并露出金属光泽。

②Argon arc weld with tgs-50 welding wire.

焊条选用 tgs-50 氩弧焊丝。

③The material have to be approved by DNV surveyor. Or there is DNV certification.

盘管材质必须经 DNV 认可或有 DNV 证书。

④Welder should be certificated.

焊工必须持证上岗。

(3) Welding bead have to be tested 100% by MT.

盘管组焊接成后焊口 100%磁粉探伤。

(4) Water pressure test (0.98 MPa), if no leakage within 30 minutes, then submit the results to DNV surveyor and ship owner.

做水压试验 0.98 MPa,30 分钟不漏,交 DNV 验船师及船东验收。

Example 8 Aux. boiler water space crack welding procedure (辅锅炉水腔板裂纹焊补工艺规程)

1. Chemical composition analysis should be made to the welded part's material according to the drawing or other data, or chemical examination should be made with owner and surveyor's authority.

锅炉水腔需焊补的母材要根据图纸或资料进行化学成分分析,或者取一部分母材进行化验(需经船检及船东同意)。

2. The property of the electrode being chosen should not be less than the property of the boiler's water space plate. The type of the electrode is J427.

根据母材的化学成分,所选焊条的力学性能应不低于母材的下限值,焊条为 J427。

3. Thickness of the plate is 22 mm. MT should be made to determine depth and length of the crack. Slope should be made and approved by surveyor.

水腔板测厚为 22 mm,进行磁粉探伤确定裂纹的深度、长度,打磨坡口并向船检交验。

4. The electrode J427(ø3.2) should be certified by LR or CCS. Welding voltage is 22 V~23 V, welding current is 100 A~120 A. The electrode should be preheated at the normal temperature before welding.

焊条 J427(ø3.2),出示 LR 认可的船检证书或 CCS 证书,焊接电压 22~23 V,电流 100

~120 A,焊条焊前常温烘焙。

5. Welder should be certified by LR. Surface of the welding groove should be flat and smooth; the welding seam should be ground and mechanical treated after welding.
焊工由 LR 认可的焊工担任,焊补的坡口表面须光滑平整,焊补后须将高出板面的焊缝磨平,并进行机械处理。

6. Keep the temperature for 24 hours after welding being finished, do MT and present the results to ship owner and surveyor.
焊后保温 24 小时后做磁粉探伤检查,交船检、船东验收。

Example 9 Repairing workmanship about collection box and steam coil pipe of the exhaust gas boiler (废气锅炉联箱及盘管修换工艺)

The ship has one set exhaust gas boiler, the boiler's working pressure is 0.5 MPa, the boiler's two sets collect box all need to be changed based on ship owner's suggestion; material is 20 g (ø273×δ9). Coil pipe should be done pressure test per single set, then decide repair range, material is 20 g, steel tube is ø31.8×δ3.2, the detail step is as following:

该船废气锅炉一台,工作压力为 0.5 MPa,根据船方意见,该炉联箱全部换新,材料选用 20# 锅炉管,规格 ø273×δ9,盘管单组磅压检查,局部换新,材料选用 20# 锅炉管,规格 ø31.8×δ3.2,其具体工艺如下:

1. Dismantle body with connect pipe, remove protection coat and insulation coat, clean inside.
拆除与炉体连接的管件、阀件,将炉外衣及绝缘层剥除,清扫干净。

2. Use cutting torch to separate coil pipe from collect box, then grind coil pipe root and make welding groove. All the connection pipes between coil pipe and collect box should be renewed.
沿盘管根部用气割将之与联箱分开,打磨盘管根部并做焊接坡口。联箱与盘管间的连管全部换新。

3. Coil pipe should be done pressure test to check leakage for per single set, it's up to ship owner to decide how to repair (totally or partly renewed).
将盘管单组磅压,检查漏点,由船方决定盘管是否全部换新或局部修理。

4. The welding of connection parts is shown by following figure.
接头的焊接形式如图所示。

5. Because coil pipes have corroded and blocked seriously, the new pipe and old one perhaps can not be welded together, if it is true, the ship owner should to decide the repairing range again.
因为盘管锈蚀、堵塞严重,在焊接过程中可能会出现新管与旧管无法焊接的现象,此时需由船方重新确定工程范围。

6. Measure and make new collecting box, within the range of 20 mm around the connection pipe hole on the collect box should be grinded completely, and weld the connection pipe on the box body based on introduction drawings supplied by ship owner.

现场测绘并制作新联箱,联箱管孔周围 20 mm 范围内打磨干净,并按船方提供的图纸焊接连管。

7. The brace and stiffening plate should be checked and repaired according to the detail condition.
炉内的盘管牵条及加强筋视情况修换。

8. After coil pipe being repaired, do pressure test for each set of coil pipe (test pressure is 0.82 MPa, test time is 5 min) and present to surveyor.
修后的盘管单组磅压,试验压力为 0.82 MPa,5 分钟不漏交验。

9. Install back coil pipe and collect box, after orientating, weld the connection together according to the drawings.
回装盘管及联箱,定位后现场焊接盘管与联箱的接口处,形式按船供图纸。

10. Do pressure tests, if no leakage under the pressure of 0.75 MPa, then present results to surveyor.
做压力试验,按 0.75 MPa 不漏交验。

11. Install back insulation coat, valves and pipes. All pipes and all electrodes should have survey certificate, select JH427 as electrode.
恢复绝缘外衣及管路、阀件,所有管及焊条均应具有船检认可的证书,焊条选用 JH427。

12. Welder should have DNV certificate and select welding appearance by one side as welding form.
焊工应持有 DNV 认可证书上岗,焊接采用单面焊双面成型。

Example 10 Aux. boiler tube replacing workmanship (辅锅炉烟管更换工艺)

1. Open the man holes, clean the fire side ash and clean the water side by chemical.
打开人孔,清除烟侧烟灰,水侧化学清洗。

2. Confirm the position and number of the tube needed to be replaced according to the requirements of the ship owner.
按船东要求确定需更换管的位置及数量:
数量 (number):4 pcs. 规格 (type):ø50.8×3.2 船供(owner supply)

3. Cut the welding place of the tube which is needed to be replaced and draw out the tube from the tube sheet.
用火焰切割方法将需要更换的管沿焊接处切除,并将管子抽出。

4. Grind purely the hole of the tube and measure the distance between the upper and lower tube sheet.
将需更换管子的管孔打磨清理干净,测量上下管板间的实际距离。

5. Fabricate the tube slightly longer than the measurement by 10 mm.
按实测长度加长 10 mm 进行下料。

6. Clean and remove the oil and rust around the ends of the new tube before welding.
新管焊接前,管端及管孔周围应去除油污、铁锈等杂质。

7. Take tungsten-inert-gas arc welding as base welding, and manual arc welding as full weld-

ing.

焊接时采用钨极惰性气体保护电弧焊打底,手工电弧焊盖面。

8. Select TGS-50 as welding electrode, welding current is 100 A, and welding voltage is 220 V.

氩弧焊条选用 TGS-50,电流 100 A,电压 220 V。

9. Select J427 as manual arc welding electrode, welding current is 100～120 A, and welding voltage is 24 V. The welding of tube to tube sheet have to be performed by B.S qualified welders.

手工电弧焊焊条选用 J427,电流 110～120 A,电压 24 V,焊工需经 B.S 船检认可。

10. Pipe ends should be slightly expanded before and after welding.

焊接前后管头均要轻胀。

11. 100% dye test and water pressure test (1.5 times of the designed pressure (1.45 MP), kept 10 minutes without leakage) should be done after welding, and the tests results should be submitted to ship owner and surveyor.

焊接结束后应进行 100% 着色探伤及水压试验,试验压力为 1.5 倍设计压力,即 1.45 MPa,保压 10 分钟,交船东及验船师验收。

12. Reassemble man holes and other attachments after satisfied checking.

验收合格后,装复烟箱门及其他附件。

Example 11 Welding workmanship about sanitary tank (卫生水柜焊接制作工艺)

1. Fabricate two new end covers with steel plate according to ship's drawing (steel plate thickness is 6 mm).

按船供图纸压制 $\delta=6$ mm 半圆封头 2 件。

2. Fabricate a new drum body with steel plate according to ship's drawing. (steel plate thickness is 6 mm).

按船供图纸卷制 $\delta=6$ mm 圆柱桶体一个。

3. When weld between the drum body and end cover, weld the connection parts as following Fig. 6.2(a) and Fig. 6.2(b).

桶体与封头焊接时,按 Fig. 6.2(a)和 Fig. 6.2(b)施焊。

4. Welded by CO_2 protection welding.

采用 CO_2 焊接的方法进行焊接。

5. The tank is pressure tested up to 0.8 MPa after completely welding, and then submits results to ship owner and surveyor.

焊接成后,进行 0.8 MPa 水压试验,交船东和验船师验收。

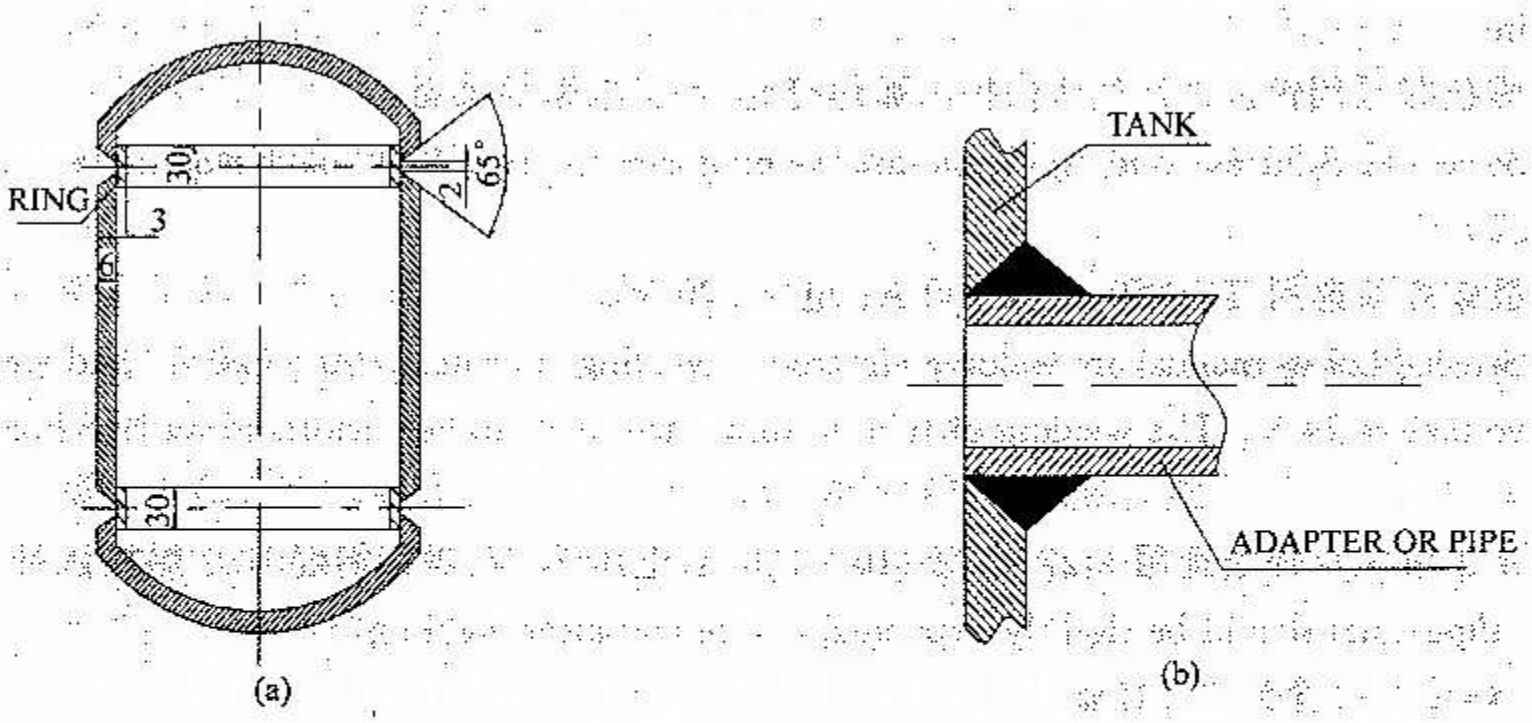


Fig. 6.2

Example 12 Renewing workmanship for M/E cylinder jackets (主机缸体换新工艺)

The No.2, 4 cylinder jackets of M/E have been damaged. They should be replaced by ship owner's spares after being machined.

该船主机2号、4号缸体已损坏,由船方供给毛坯加工换新。

The procedure should be carried out as follows:

按如下工艺步骤进行:

1. The deflection of M/E should be measured firstly, and recorded the data.
   测量主机臂距差,记录数据。
2. The left top surface of the frame and the seating of No.1, 2, 3, 4 cylinder jackets should be marked with basic points. When the basic points is marked, the cylinder jacket not allowed to be machined, the top inclined surface of frame could be machined as basic surface of 15×10 mm^2 as the side surface of cylinder jacket, and measure the dimensions.
   1号、2号、3号、4号缸体底座与机架左上侧面做好基准点,测量每个缸体与机架侧面尺寸。作基准点时,不准加工缸体部分,机架的上斜面可以加工成与缸体一平板 15×10 mm^2 面积的基准面,测量尺寸。
3. The aft turbocharger should be removed, and be shifted out from engine room.
   将后端盖增压器吊出机舱。
4. The right supports, cables, lines and exhaust pipes of No.1,2,3,4 cylinders should be removed. The left cooling water pipes, starting air pipes, and high pressure oil pipes should be dismantled also.
   拆卸右端支架、电缆、管系和1号、2号、3号、4号缸排烟管及扫气管。左端冷却水管、起动空气管及高压油管也应拆除。
5. The cylinder covers of No.1,2,3,4 cylinders should be dismantled and hoisted to workshop. The pistons should be hoisted (each crosshead and piston rod should be recorded), the piston rings and the packing box should be dismantled. The clearances of connecting

crankshaft pin bearing and crosshead bearing would be dispelled, ballast water would be adjusted so that the draft of fore and aft peak don't exceed 1 m. Turn the gear, align the piston device at upright 30° and downright 150° positions.

打开1号、2号、3号、4号缸盖吊到车间。活塞吊起,记录每个十字头与活塞杆刻度,拆掉胀圈及围袋。消除连曲柄销轴瓦及十字头销轴瓦间隙。船体压载前后吃水不超过1 m,盘车测量活塞装置对中尺码,只测量上右30°,下右150°两个部位尺寸。

6. Lose the tie-rods, and record the disassembled pressure. The fitting bolts between No. 1, 2,3,4 cylinder jackets and frame, jacket and jacket would be loosened.

松开贯穿螺栓,并记录分解压力数据。松开1号、2号、3号、4号缸体与机架、缸体与缸体之间的紧配连接螺栓。

7. Measure the clearances between cylinder jacket and jacket, jacket and frame, record the dimensions. And repeat it after 12 hours after all bolts disassembled.

测量缸体与缸体、缸体与机架之间的间隙,此尺寸应在全部螺栓分解后12小时再测量。

8. Pull out the cylinder liner of No. 2,4 cylinders, and the cylinder jackets of No. 1,2,3,4, would be hoisted to workshop. The dimensions of No. 2, 4 cylinder jackets should be checked according to the drawings supplied by ship owner. After that the new cylinder jackets could start to be machined. The top holes of the frame should be covered with wood and put plastic clothes on the wood covers.

拔出2号、4号缸套,吊起1号、2号、3号、4号缸体,按船方供给的图纸校对2号、4号缸体尺寸,进行新缸体的加工。机架上孔做木盖盖好,在木盖外盖塑料布。

9. The bolts of bed plate should be tightened once according to instruction book.

机座螺栓按要求上紧一遍。

10. The deflection should be measured and recorded.

测量臂距差,记录数据。

11. After machining of the new cylinder jackets being finished, the new cylinder jackets and old ones would be fitted on the frame in the order. their left surface should be aligned with the basic point of the frame, the clearance between jackets, jacket and frame should be measured and recorded. Tighten the jackets with general bolts, and measure with 0.10 mm feeler, plugging depth can not exceed 50 mm, width can not exceed 100 mm, and each cylinder section can not exceed 3 places.

缸体成品后,按次序与旧缸体摆在机架上,对好左侧与机架基准点位置,测量缸体与缸体、缸体与机架接合面间隙并记录。用螺栓将缸体连起把紧,用0.10 mm塞尺检查,插入深度不超过50 mm,宽度不超过100 mm,一个缸体不超过3处。

12. Tighten the tie-rods.

把紧贯穿螺栓。

13. The deflection should be checked, if it exceeds 0.2 mm, the tightened pressure of tie-rods could be adjusted by 10% until the deflection is qualified.

检查拐挡尺寸,如超过0.20 mm,则将贯穿螺栓的把紧压力调整10%,直到臂距差符

合要求。

14. Assemble the piston devices without piston rings for alignment; if the dimension of alignment is in accordance with the requirement, the cylinder jackets could be milled, and bolts would be fitted; if dimensions of alignment don't accord with the requirement, then check the verticality between the cylinder center and crankshaft center by line drawing; if verticality exceeds 0.15 mm/m, the top surface of the cylinder jacket could be adjusted until the verticality is qualified.
活塞装置不装活塞环装入气缸找正,如果符合要求,则进行缸体之间的铣孔并配螺栓。如装置找正达不到要求,则进行单缸拉线找正,检查气缸中心线与曲轴中心线的不垂直度,如超过 0.15 mm/m,则调整缸体上平面以达到要求。

15. The holes of cylinder jacket should be milled. And the bolts of cylinder jackets should be machined and fitted.
气缸本体接合面铣孔配螺栓。

16. Assemble the exhaust pipes and the attachments.
装复排气管及附件。

17. Measure the deflection again, and it can not exceed 0.2 mm.
复查一次臂距差,不得超过 0.2 mm。

Standard of citation:
引用标准:

1. Instruction book of MAN K.S.Z 90/160 A marine diesel engine.
MAN K.S.Z 90/160 A 主机说明书。
2. CB/T 3501-93: the repair technical requirements of marine diesel engine cylinder jacket.
CB/T 3501-93:船用柴油机气缸体修理技术要求。
3. CB/T 3533-94: the technical requirements of marine diesel repairing and installing.
CB/T 3533-94:船用柴油机修理安装要求。
4. CB/T 3533-94: the technical requirements of marine diesel crankshaft repairing.
CB/T 3533-94:船用柴油机曲轴修理技术要求。

Example 13 Inspection and repair list (检修加工单)

制冷装置海水泵(3台)	Refrigerator sea water pumps (3 sets)
1.水轮水封口6处补铜焊,上床光车	1. Weld the sealing surface 6 places of the impeller with copper, and be machined on lathe
2.水轮轴上床检查,光车	2. Make alignment to the impeller shaft and be machined on lathe
3.水环换新 (Φ200/Φ175×20×6个,铜)	3. Renew the mouth ring (Φ200/Φ175×20×6 pcs. brass)
4.轴套换新 (Φ60×160×1个,不锈钢)	4. Renew the shaft bush (Φ60×160×1 pc. stainless steel)
5.盘根压盖上床光车,新做内套 (Φ80/Φ60×37×3个)	5. machine the inner surface of the packing cover, and make new bush for it (Φ80/Φ60×37×3 pcs.)
6.轴承换新6个 (型号:6212,厂供)	6. Renewed bearing 6 pcs. (type:6212, yard supply)
7.聚四氟乙烯密封环新做 (Φ90/Φ60×20×2个)	7. Renew the PTFE sealing rings (Φ90/Φ60×20×2 pcs.)
制冷压缩机(5台)	Refrigerator compressor (5 sets)
1. 新做压缩机端盖橡胶密封圈 (Φ150×Φ140×10个)	1. Make new rubber rings for the compressor covers (Φ150×Φ140×10 pcs.)
2.轴承换新6个(型号:7313)	2. Renewed bearing 6pcs. (type: 7313)
3. 调整垫片新做一个 (Φ90/Φ70×27)	3. Renew 1 pc. of adjustable gasket (Φ90/Φ70×27)
4.轴承内套新做 (Φ90/Φ70×27×1个,不锈钢)	4. Renew the bearing bush (Φ90/Φ70×27×1 pc. stainless steel)

船东代表 Owner's representative:xxx

船务公司代表 Yard's representative:yyy

公证人 Confirmed with satisfaction by:www

日期 Date: ××××/××/××

Example 14 Docking finish bill (坞修工程完工单)

Docking finish bill **Page 1**

Ship's name: xxxxxx
Project catalog: painting work

Item No.	Description of repair works	Price
	Unit of dimension: mm	
	Cargo hold works	
A)	Erected all staging in 7 pcs. holds for blasting and painting as follows: No. 1 hold: F: 28 m × 6 m × 18 m A: 32 m × 6 m × 18 m P&S: 21 m × 9 m × 18 m × 2 pcs. No. 2 ~ 6 hold: F&A: 32 m × 6 m × 18 m × 2 × 5 pcs. P&S: 25 m × 9 m × 18 m × 2 × 5 pcs. No. 7 hold: F&A: 32 m × 6 m × 18 m × 2 pcs. P&S: 26 m × 9 m × 18 m × 2 pcs.	
B)	Washed and cleaned all 7 pcs. holds (total: 22 795 m^2) with high pressure fresh water for removing dirt and salt, then pumped out water 120 tons	
C)	All cargo holds were grit spot blasted as follows: 15 908 m^2 area grit spot blasted up to SA 2.0 2 923 m^2 area grit spot blasted up to SA 1.0	
D)	Before painting, all cargo holds were cleaned, and removed out dust and grit	
E)	All 7 pcs. holds were applied two full coats of epoxy paint: 22 795 m^2 area applied on coat of grey epoxy paint (125 micron) 22 795 m^2 area applied on coat of red epoxy paint (125 micron)	
F)	All 7 pcs. holds were applied on stripe coat as follows: All frame shell seams: 9 m × 2 × 31 pcs., 2 × 7 pcs.	
Add:	Provided 2 pcs. cherry pickers and driver 20 hours for owner close-up survey of all holds	
R.W.S.	Double bottom tank work	
1	No. 2 D.B.TK 400 m^2 was heavy chipped out rust thoroughly 1 460 m^2 was washed with high pressure flesh water 440 m^2 was applied 2 coats of 300 micron tar-epoxy paint	
2	No. 3 D.B.TK 500 m^2 was heavy chipped out rust thoroughly 1 810 m^2 was washed with high pressure flesh water 550 m^2 was applied 2 coats of 300 micron tar-epoxy paint	

完工单(译文)

第 1 页

船名：xxxxxx
工程项目：涂装工程

序号	工程内容	价格
	单位：mm	
	货舱工作	
A)	7 个货舱为打砂，喷漆搭脚手架如下： No.1 货舱：前部：28 m×6 m×18 m 后部：32 m×6 m×18 m 左，右：21 m×9 m×18 m×2 组 No.2～6 货舱：前，后部：32 m×6 m×18 m×2×5 组 左，右：25 m×9 m×18 m×2×5 组 No.7 货舱：前，后部：32 m×6 m×18 m×2 组 左，右：26 m×9m×18 m×2 组	
B)	7 个货舱(总面积 22 795 m^2)高压淡水冲洗去除脏物和盐，然后排水 120 t	
C)	所有货舱局部打砂如下： 15 908 m^2 打砂至 SA 2.0 级 2 923 m^2 打砂至 SA 1.0 级	
D)	喷漆之前所有货舱做清洁、清灰、清尘	
E)	所有 7 个货舱统喷两度环氧油漆： 一度灰色环氧油漆 22 795 m^2(125 μm) 一度红色环氧油漆 22 795 m^2(125 μm)	
F)	所有 7 个货舱做一度预涂如下： 所有肋骨焊缝：9 m×2×31 条，2×7 个货舱 另外：两部高架车及其司机提供给船东做封舱检查 20 小时	
R.W.S	双层底工作 1. No.2 双层底 400 m^2 敲铲除锈 1 460 m^2 高压淡水冲洗 440 m^2 喷涂两度 300 μm 厚焦油环氧漆 2. No.3 双层底 500 m^2 敲铲除锈 1 810 m^2 高压淡水冲洗 550 m^2 喷涂两度 300 μm 厚焦油环氧漆	

Finish bill **Page 2**

Ship's name: xxx
Project catalog: painting work

Item No.	Description of repair works	Price
	Unit of dimension: mm	
3	No. 4 D. B. TK 700 m^2 was heavy chipped out rust thoroughly 2 920 m^2 was washed with high pressure flesh water 770 m^2 was applied 2 coats of 300 micron tar-epoxy paint	
4	All No. 2～4 D. B. TK cleaning up bottom and removed out mud as follows: No. 2 D. B. TK 2 tons No. 3 D. B. TK 10 tons No. 4 D. B. TK 7 tons	
5	All No. 2～4 D. B. TK pumped out dirt water 50 tons	
6	Ventilated 3 day with 6 pcs. of 11 kW ventilator for wet dry and print drying in No. 2～4 D. B. TK	
7	Supplied one shifting air compressor for spray sticky tar-epoxy paint in No. 2～4 D. B. TK as follows: No. 2 D. B. TK 8 hours No. 3 D. B. TK 10 hours No. 4 D. B. TK 10 hours	
R. W. S.	Man hole work	
1	Opened and closed 12 pcs. man hold cover on lower stools	
2	Welded and renewed 200 pcs. of stainless steel bolts(M 20×60)	
3	Yard supplied 240 pcs. of stainless steel nuts (M 20)	
4	Yard supplied 12 pcs. of rubber packing of all man holes	
3.3.2	Opened and closed grating 6 pcs. of sea chests 4 pcs. sea chest were cleaned and scraped Applied new coating as per flat bottom painting system Welded 10 pcs. ×5 kg zinc anodes in 4 pcs. sea chests by yard supplied 10 pcs. anodes were protected with tape during painting	
400	Entire surface (total: 12 940 m^2) of hull were cleaned thoroughly with high pressure fresh water	
401	Top side area: 2 080 m^2 65% area grit blasted up to SA 2.0 15% area grit blasted up to SA 1.0	

完工单

第 2 页

船名：xxxxxx
工程项目：涂装工程

序号	工程内容	价格
	单位：mm	
3	No.4 双层底 700 m^2 敲铲除锈 2 920 m^2 高压淡水冲洗 770 m^2 喷涂两度 300 μm 厚焦油环氧漆	
4	No.2～4 双层底清洁排污泥如下： No.2 双层底 2 t No.3 双层底 10 t No.4 双层底 7 t	
5	No.2～4 双层底排污水 50 t	
6	No.2～4 双层底为了除湿和油漆干燥 6 台 11 kW 通风机通风 3 天	
7	No.2～4 双层底为了喷焦油环氧漆使用空压机一台时间如下： No.2 双层底 8 小时 No.3 双层底 10 小时 No.4 双层底 10 小时	
R.W.S	人孔工作	
1	下壁墩开关 12 个人孔盖	
2	焊接并更新 200 条不锈钢螺栓(M20×60)	
3	船厂提供 240 个不锈钢螺母(M20)	
4	船厂提供 12 个人孔橡胶垫	
3.3.2	打开并关闭 6 个海底阀箱格栅板 清洁 4 个海底阀箱 并施工新油漆配套同平底一样 船厂提供 10 块 5 kg 锌块并焊于 4 个海底阀箱内 喷漆过程中 10 块锌块用胶带进行保护	
400	整个船壳表面(总共 12 940 m^2)用高压淡水冲洗	
401	干弦面积：2 080 m^2 65%打砂至 SA 2.0 15%打砂至 SA 1.0	

Finish bill

Ship's name : xxxxxx
Project catalog: Painting work

Item No.	Description of repair works	Price
	Unit of dimension: mm	
	100% area applied one full coat of epoxy paint(150 micron) 100% area applied one full coat of epoxy paint	
402	Boottoping area: 2 400 m^2 85% area grit blasted up to SA 2.0 100% area applied one full coat of epoxy (I 75 micron) 100% area applied one full coat of epoxy (75 micron) 100% area applied two full coats of S.P.C anti-fouling paint (100 micron/each coat)	
403	Vertical sides: 3 300 m^2 10% area grit blasted up to SA 2.0 20% area grit swept up to SA 1.0 40% area touched up one coat of epoxy paint (175 micron) 50% area touched up one coat of epoxy paint (75 micron) 100% area applied two full coats of S.P.C anti-fouling paint (120 micron/each coat)	
404	Flat bottom: 5 160 m^2 3% area grit blasted up to SA 2.0 20% area grit swept up to SA 1.0 40% area touched up one coat of epoxy paint (175 micron) 40% area touched up one coat of epoxy paint (75 micron) 150% area touched up one coat of S.P.C anti-fouling paint (75 micron) 100% area applied one full coat of S.P.C anti-fouling paint (160 micron)	
405		
A)	Repainted ship's marks as follows: Draft marks, plimsoll markings, ship's name, port of registry, tug marks, tank marks, bulbous bow mark	
B)	Made new pilot marks both side	
C)	Drew and painted new loading water lines both side (L224 m)	
D)	Installed temporary scupper outlet 30 pcs. for painting	
Add:	Cleaned 10 m^2 oily bottom and 80 kg waste oil for engine room work fire-proof	

Confirmed with satisfaction by 确认签字:xxx

Owner's representative 船东代表:yyy

Yard's representative 船厂代表:www

完工单

第 3 页

船名：xxxxxx
工程项目：涂装工程

序号	工程内容	价格
	单位：mm	
	100％面积通涂一度环氧油漆(150 μm) 100％面积通涂一度环氧油漆	
402	水线间面积：2 400 m^2 85％打砂至 SA 2.0 100％面积通涂一度环氧油漆(175 μm) 100％面积通涂一度环氧油漆(75 μm) 100％面积通涂两度自抛光防污漆(100 μm/一度)	
403	直底面积：3 300 m^2 10％打砂至 SA 2.0 20％扫砂至 SA 1.0 40％面积补涂一度环氧油漆(175 μm) 50％面积补涂一度环氧油漆(75 μm) 100％面积通涂二度自抛光防污漆(120 μm/一度)	
404	平底面积：5 160 m^2 3％打砂至 SA 2.0 20％扫砂至 SA 1.0 40％面积补涂一度环氧油漆(175 μm) 40％面积补涂一度环氧油漆(75 μm) 50％面积补涂一度自抛光防污漆漆(75 μm) 100％面积通涂一度自抛光防污漆(160 μm)	
405		
A)	重描船上标志如下： 水尺，载重标志，船名，注册港，拖轮标志，分舱标志，球鼻首标志	
B)	左右两舷新做领航员标志	
C)	左右两舷重描水线(长度 224 m)	
D)	为了油漆施工安装临时排水孔挡板 30 块	
	另外，为避免机舱工作引起火灾，清洁废油 80 kg 和舱底 10 m^2	

Confirmed with satisfaction by 确认签字：

Owner's representative 船东代表：

Yard's representative 船厂代表：

PART 3 Testing outline(修船试验大纲)

Example 1 G/E testing outline (发电柴油机试车大纲)

1. Running-in

磨合

1)No load running-in for 2 hours。

空车磨合 2 小时。

2)Adding 25% test load (124.03 kW)running in for one hour。

加 25%试验负荷(124.03 kW)磨合 1 小时。

3)Adding 50% test load (248.06 kW)running-in for 30 min。

加 50%试验负荷(248.06 kW)磨合 30 min。

4)Test load:n=661.5 kW×75% =496.1 kW。

试验负荷:n=661.5 kW×75% =496.1 kW。

2. Load test

负荷试验

Rev. 720 r/min 转速:720 r/min

负荷 Load/%	功率 Power/kW	时间 Time/min	记录次数 Number of measuring	备注 Remarks
25	124.03	20	1	
50	248.06	20	1	
75	372.09	20	1	
100	496.10	120	2	

Compressed pressure, explosion pressure and exhaust temperature error are as follows: Compressed pressure deflection is less than ±2.5%, explosion pressure deflection is less than 4%, and exhaust temperature deflection is less than ±7%.

压缩压力、爆发压力、排烟温度误差应符合如下要求:压缩压力≤±2.5%,爆发压力≤4%,排烟温度≤±7%。

3. Governor characteristic test

调速器性能试验

The test load is in accordance with 100%→0% and 0%→50%→100% performed (rated speed:720 r/min), the test requirements is as follows:

单机按 100%→0% 和 0%→50%→100%增减试验负荷,试验时要求如下(额定转速 720 r/min):

1) Instantaneous speed change is less than 10% rated speed.
瞬时调速率不大于额定转速的 10%。

2) Stable speed change is less than 5% rated speed.
稳定调速率不大于额定转速的 5%。

3) Stable time is less than 5 seconds.
稳定时间不大于 5 s。

4) rate of speed fluctuation is less than ±1%.
转速波动率不大于±1%。

4. test condition
试验条件
L.O.P: 0.2~ 0.3 MPa
滑油压力: 0.2~0.3 MPa
C.W.P.:0.25~0.35 MPa
冷却水压力:0.25~0.35 MPa
Exh. temperature: 450 ℃
排烟温度:450 ℃
Above test should be submitted to the shipyard inspector, C/E and surveyor for checking.
以上试验交工厂检查员、轮机长及验船师检查。

Example 2 Mooring test outline (系泊试验大纲)

M/V _____ Mooring test outline DATE: _____
_____轮系泊试验大纲 日期: _____

1:General (一般参数)

Engine type 机 型	Rated power 额定功率	Rated speed 额定转速	Date of produced 制造日期	Daily max. power 常用最大功率	Daily max. speed 常用最大转速

2:Starting test (起动试验)

Times 次数	Ahead 正 车	Astern 倒 车	Remarks 备 注

3:Running-in test(磨合试验)

If any moving parts have been renewed, the running-in test must be carried out.
如果运动部件换新,必须做磨合试验。

Speed of running-in 磨合转速/(r·min^{-1})	Test time/h 试验时间/h

4:Running test (运转试验)

	Speed 转 速	Test time/h 试验时间/h	Remarks 备 注
Ahead 正 车			
Astern 倒 车			

5: In condition of _____ r/min of main engine, the various parameters have to be taken。

主机在_____ r/min,测量有关参数。

This outline have been approved by personnel as follows:

本试验大纲经下列人员签字认可:

Ship's representative(船东代表): Surveyor(验船师):

Yard's engineer in charge(厂方主管): Yard's inspector(厂方检验):

作者注:

M/V: Merchant Vessel 商船

rpm: revolutions per minute 转数/分

Example 3 Generating set test report (发电机组试验大纲)

M/V _____ GENERATING SET TEST REPORT DATE: _____

_____发电机组试验大纲 日期: _____

Data in generator's nameplate 发电机铭牌数据	Rated voltage 额定电压/V	Rated current 额定电流/A	Rated power 额定功率/kW	Rated revolution 额定转速/($r \cdot min^{-1}$)
Main data of diesel engine 柴油机主要数据	Type 型 号	Power 功率/kW	Rated revolution 额定转速/($r \cdot min^{-1}$)	

Process 步 骤	Test item 试验项目	Contents & requirements 内容及要求			
1	Individual unit load 单机负荷	Load/% 负 荷/%	Power/kW 功 率/kW	Test time/h 试验时间/h	Remarks 备 注
2	Individual unit speed variation 单机变速	Continuously make suddenly speed up - speed down for three times 突加、突减连续做三次			
3	Main switch protection 主开关保护	Over-load 过载/A	Reverse-power 逆功/kW	Under-voltage 欠压/V	
4	Parallel operation 并 车	From 20% of rated power to normal max power 从20%额定功率至常用最大功率			

Note(注):

1. After full load test of generator, measure hot insulation resistance.
   在发电机满负荷试验结束后测热态绝缘电阻。
2. Measure exhaust temperature & explosive pressure in case of _____ kW of max load test for auxiliary engine.
   在辅机最大试验负荷_____ kW 的工况下,测量排温及爆压。
3. Measure engine's temperature and generator bearing's temperature according to detail situation.
   视情况抽检柴油机、发电机轴承温度。

船方代表(Ship's representative): 验船代表(Surveyor):

厂方主管(Yard's engineer in charge): 厂方检验(Yard's inspector):

Example 4 Aux. Engine testing outline (发电机试验大纲)

1. Diesel engine running-in.
   柴油机磨合。
   1) Running-in 6 hours on no load.
      空载磨合 6 小时。
   2) Adding 25% test load and running-in for 1 hour. (156 kW)
      加 25%试验负荷磨合 1 小时。
   3) Adding 50% test load and running-in for 1 hour. (312 kW)
      加 50%试验负荷磨合 1 小时。
   4) Adding 75% test load and running-in for 1 hour. (468 kW)
      加 75%试验负荷磨合 1 小时。
2. Load test to be carried out according to following table:
   负荷试验按下表进行:

项目 Item / 序号 No.	试验负荷 Test load		转速/(r·min⁻¹)	试验时间/h Test time
	百分比/% Percent	功率/kW Power		
1	25	156	720	1
2	50	312	720	1
3	75	468	720	1
4	100	624	720	1

3. If 100% load can not reach, trying to add to the max load, but it should not be less than 75% rated load.

如果负荷加不到100%，可试加到最大负荷，但不能低于75%额定负荷。

Under every operating condition, record each parameter once per 15 minutes.

在每种工况下，每隔15分钟记录一次各参数。

Under full load or max Load, measure actual combustion pressure, exhaust temperature and compression pressure etc., difference between each cylinder's parameter and average value should be in accordance with the following:

在满负荷或最大负荷的情况下，测量爆发压力、排烟温度和压缩压力等参数，这些参数的平均值与各缸参数的差值应符合下列范围：

A) Compression pressure difference ≤2.5%;

压缩压力偏差≤2.5%;

B) Combustion pressure difference ≤4%;

爆发压力偏差≤4%;

C) Exhaust temperature difference ≤7%.

排烟温度偏差≤7%。

4. Parallel operation test.

When the load is variable in range of 200～1 000 kW, the difference of the ratio of the load on every generator should be less than 25%.

并车试验。

当负荷在200～1 000 kW内变化时，分配到各机的负荷比例之差不得超过25%。

		正常值	极限值
Pressure 压力/MPa	Starting air 起动空气	2.5～3.0	1.5
	Fuel oil 燃油	0.25～0.35	
	Lubricating oil 滑油	0.3～0.4	0.25
	Cooling water 冷却水	0.1～0.25	0.08
Temperature 温度/℃	Inlet air 进气	45～55	
	Exhaust gas 排气	450	
	Lubricating oil 滑油	60～75	90
	Cooling water 冷却水	65～85	90

编 制 Designed by:xxx

审 核 Checked by:yyy

船方签字 Ship's representative:ggg

日 期 Date:2004/02/26

Example 5 Lifeboat davit load test (救生艇艇架吊重试验)

The ship has two lifeboats on starboard/port side, capacity of each boat is 36 persons, the boat weight as follow:

Empty boat weight: 1 420 kg

Total persons weight: 2 700 kg

Equipment weight: 420 kg

Total weight: 1 420 + 2 700 + 420 = 4 540 kg

So test weight is 4 540 × 1.1 = 4 994 kg

When test, lifeboat should be lowered down by seashore crane first, and test weight should be replaced by weight block, test step is as follow:

1. Hoist weight block by means of davit hook, after 5 minutes, lower down slowly to water surface and hoist up again, inspect davit condition.

2. If all condition is good, lower down weight block with high speed, when it reaches about 100 mm up to water surface, stop it with emergency brake, check davit and brake equipment, if all being on good conditions, report it to ship owner and surveyor.

"xxxx"轮左右两舷各有救生艇一台,额定乘员 36 人/艇。其中,每艇:

空艇重量 1 420 kg

人员重量 2 700 kg

设备重量 420 kg

单艇总重 4 540 kg

试验负荷 1.1 × 4 540 = 4 994 kg

试验时,救生艇用吊车吊下,试验负荷用等重的重块替代。试验步骤:

1.通过艇架吊钩将替代负荷吊起,5 分钟后慢速放至水面,收起,检查吊臂状态。

2.一切正常后,将替代负荷以最快速度下放,至水面上方 100 mm 处紧急刹车,检查吊臂及刹车装置的状态,正常后交船东及验船师验收。

PART 4 Quotations, Agreement and Bill
(报价单、协议和账单)

Example 1 Quotations (报价单)

QUOTATION

(No.)

Date:_____

Messers,_____

Dear Sirs:

In compliance with your kind inquiry for dry-docking repair for M/V xxx, we have pleasure in quoting you as follow:

Price:_____

Working Period:_____

Place of Delivery:_____

Terms of Payment:_____

Time of Validity:_____

Remarks: the single item repairing price is listed in the below table.

We are looking forward to receiving your favorable reply.

Your very truly!

_____ Shipyard

Signature:_____

Item	Quantity	Detailed catalogue	Price per item	Total price

报价单

致:

尊敬的先生们:

遵照你们对"xx"轮年度坞修的要求,我们报价如下:

价 格:

工作周期:

提交地点:

付款时间:

有 效 期:

附 注:单项修理价格如下表所示。

期待着你们的答复。

此致

敬礼

_____船厂

签名:_____

项目	数量	细目	单价	金额

Example 2 Agreement and bill (协议和账单)

1. Agreement

Date:

With regard to the account for owner's general repair works carried out on board M/V ( ) from 15th February 2004 at ( ) shipyard, the under signed have mutually agreed as follows on the above date.

Bill File No. 2424-624-301: ¥…

Special Discount: ¥…

Revised Total: ¥…

Payment for the above agreed amount Yen ( ) shall be effected to our account with Tokyo Kobe Bank, soonest possible (not later than 25th May 2004) in Japanese Yen. All banking charges shall be for owner's account.

_____ Co. _____ Co.

协议

日期:_____

关于2004年2月15日在"××"船务公司对"××"轮进行的、船东规定的检修工程,双方同意签署如下:

账单号 No.2424-624-301: ¥……

特殊回扣: ¥……

修改后总额: ¥……

上述已经同意的款项以日元结算,尽快付给我们在东京神户银行的开户账号内(于2004年5月25日以前),一切银行费用由船东承担。

_____公司 _____公司

2. Agreement of voyage repair works

This agreement is made on between ××× Shipping Co. (hereinafter called party A) & ××× Ocean Shipping Voyage Repair Dockyard (hereinafter called party B) in connection with party A's consigning of ship voyage repair engineering, on the basis of friendship and mutual benefits.

1. Party B should fulfill the voyage repair works which party A consigned and party B received, with high quality and being on schedule. Party B undertakes a guarantee period of 3 months counted from the date on execution of repaired works consigned by party A, party B are

bound as soon as possible to repair or replace with new material at their own expense if there is any defects happened on works done, which is due to improper material or careless workmanship or design.

Party A reserves the right to remove the defects by his own means at another shipyard, if party B has no ability to remove defects in due time or in the event of danger to the ship or her cargo or when necessary because of service reason.

2. Through consultation with and agreed by the two parties, the voyage repair settlement charge should based on the "Price List for Ship Repair" applied from 1st July 1995 by China National Machinery Import and Export Co. Shanghai Branch, and multiplied by coefficient K=0.7.

3. After being in receipt of the party B's repair bill, the settlement charge should be paid to party B within 15 days.

4. Each voyage repair settlement charge consists of two parts means first 90% of the above charge being repair charge and second 10% of the above charge being rapid repair reward.

5. Party B will carry out its job on board during normal working hour unless otherwise agreed by both parties, party B is obliged to reduce transportation and all other accessory costs such as tug boat, floating crane etc. as much as possible.

6. This agreement comes into force on 1st Jan. 2001 and is to be extended automatically for the next coming year if no objection is raised by any of the parties concerned.

Each Party has a right to terminate this agreement by notifying to other party in written three months beforehand.

7. This agreement is made out in English and Chinese each in two originals, one of each for the undersigned parties.

Party A　　Party B

_____　　_____

Shipping Co.　　Shipping Voyage Repair Dockyard

航修工程协议书

××轮船股份公司(以下简称甲方)与××外轮航次修理厂(以下简称乙方)本着友好和互惠的原则,就甲方委托乙方的船舶航修工程签订如下协议。

1. 凡甲方委托、乙方承接的船舶航修工程,乙方应保质按期予以完成,乙方给予3个月的保修期,如发生维修质量问题,乙方应尽快免费保修。

若因不及时排除故障,船舶就要发生危险,或装卸货或其他原因,使乙方在预定的时间内不能排除故障时,甲方保留到其他船厂用其自己的方式排除故障的权利。

2. 经双方协商同意的修理工程的结算费用以中机公司1995年7月的价格表为依据,再乘以系数K=0.7。

3. 甲方在收到乙方修理账单后,应在15天内支付结算费用。

4. 每航次修理的结算费用包括两部分,其中90%为修理费用,10%为航次修理的速修奖。

5. 除非经双方同意而必须加班外,一般情况乙方在正常工作时间内工作,乙方并有义务尽可能减少运输及其他辅助费用,例如,拖轮、浮吊等。

6.该协议自2001年1月1日起生效,有效期1年,如任何一方无异议,则该协议将自动延期至下年。

任何一方有权终止协议,但须在终止前3个月以书面提出。

7.本协议以中、英文书就各2份,每方各1份。

甲方: 乙方:

_____ _____

轮船股份公司 外轮航修厂

3. Job Orders

The Captain & Owners,

M/V _____

Dear Sirs:

We enclosed herewith one copy of our repair account covering the works carried out on the captioned vessel during the period 15th to 24th January 2004 as follows:

We also enclose one copy signed work list for your information.

In according with the terms already advised, please arrange settlement of this account within 60 days from date hereof.

Any queries concerning this account must be reported to us by letter or telex with 30 days of receipt.

Please arrange payment in Hong Kong Dollars, Our Banker is "XXX". Our account number is "YYY".

We reserve the right to charge interest on overdue amounts in accordance with our standard conditions.

Thank you in anticipation.

Yours faithfully

_____ Ltd.

完工单

船长及船公司

_____轮

先生:

信内附上×××轮自2004年1月15日至2004年1月24日的修理完工账单。

还附上经确认的工程单复印件一份供参考。

根据已周知的条款,请在60天内付款。

对账单如有任何疑问,请在30天内用信或电传报告我们。

请以港币结算付款。我们的开户银行为"XXX",账号是"YYY"。

依据我们的惯例,我们保留因逾期付款而索要利息的权利。

先致谢意。

你们忠实的

_____公司

4. Bill

_____ Company

Ship's Name: M/V _____

Kind of Works: Owner's general repairs

Period: From _____ to _____

Finished all projects, necessary labor, materials and equipment have be furnished to accomplish all works on the subject in our shipyard, as shown in the attached sheets.

Total Amount: Yen ¥…

Description: Amount:

Bill No. 2424-624-301 ¥

(Owner's General Repairs)

_____ Co. Ltd

Item	Description	Amount
402	Electric Department Following motors dismounted from deck, landed and opposite sides bearing renewed with ship's supply: (1) Air Condition Motor: 32 kW × 1 set (2) Deck Vent Fan Motor: 11 kW × 5 sets Bearing No. 6 313zz × 8 pcs. Bearing No. 6 311zz × 2 pcs. For the above, fan casting, steel nets and packing discounted and reinstalled with following materials supplied by …: M20 × 70 × 100 pcs. M8 × 10 × 50 pcs.	¥…
403	Signal light removed, existing foundation modified, new signal light furnished and installed and cables connected, then tested	¥…

账单

_____公司

船 名: _____轮

工程种类: 船东检修工程

期 间: _____ ~ _____

在我们船厂为完成上述船舶的全部工程配备了必要的劳务、材料和装备, 如附页所示。

总费用: ¥…

说明: 账单号 No. 2424-624-301 金额: ¥

(船东检修)

公司

项目	说明	金额
402	电气部分 以下电机从甲板上拆下、运岸,两端轴承用船上备件换新: (1) 空调电机:32 kW×1 台 (2) 甲板风机电机:11 kW×5 台 轴承 No.6 313zz×8 只 轴承 No.6 311zz×2 只 对于上述项目,风筒、钢丝网以及密封拆下并以……提供的下述材料装妥: M20×70×100 只 M8×10×50 只	¥……
403	信号灯拆除,底座修改,新的信号灯装妥,电缆接妥,并进行了试验	¥……

CHAPTER 7 SPECIAL TERMS
(修船英语词汇表)

PART 1 Ranks of ship's crew(船员职务)

crew	全体船员
captain(master)	船长
political commissar	政委
chief officer or chief mate(first mate)	大副
second officer or second mate	二副
third officer or third mate	三副
assistant officer	驾助
apprentice officer	实习驾驶员
cadet	见习生
radio officer(radio operator, wireless operator)	报务员
chief radio officer	报务主任
assistant radio officer	报助
purser (chief purser)	管事,事务长
secretary	秘书
clerk	事务员
doctor	医生
surgeon	外科医生
nurse	护士
boatswain or bosun	水手长
cassab	副水手长
supercargo	货运管理员,押运员
carpenter	木匠
quartermaster	舵工
coxswain	舵工,艇长
helmsman	舵工,舵手
able seaman	全能水手,一级水手
A.B.(able bodied seaman)	全能水手,一级水手
E.D,H.(efficient deck hand)	全能水手
O.H.U.(deck hand uncertified)	见习水手
O.S.(ordinary seaman)	普通水手,二水
seaman	普通水手,海员
mariner	海员

cook	厨师
baker	面包师
donkeyman	加油领班;副司炉;辅机操作工
engine cadet	轮机见习生
engineer	轮机员,工程师
chief engineer	轮机长(俗称大车,老轨)
second engineer	大管轮(俗称二车,二轨)
third engineer	二管轮(俗称三车,三轨)
fourth engineer	三管轮(俗称四车,四轨)
junior engineer	二/三管轮
apprentice engineer	实习轮机员
assistant engineer	轮助
assistant electrical engineer	电助
reefer engineer	冷藏员
electrician	电工
electrical engineer	电机员
fitter	铜匠,修理工
repairer	修理工
mechanic	机工,机匠
motorman	机工,机匠
No. 1 fireman	生火长
No. 1 oiler	加油长
fireman	生火工
greaser (oiler)	加油工
cleaner or wiper	清洁工
pumpman	泵工
wireman	电线工
store keeper	物料管理员
steward	服务员
chief steward	大服务员
assistant steward	助理服务员
stewardess	女服务员
chief cook	大厨
second cook	二厨
galley boy (steward)	厨房服务生
pantry boy(steward)	餐配服务生
saloon boy(steward)	大台服务生
cabin boy(steward)	房间服务生
captain's boy	船长服务生

ship's complement	船上的定员
mess boy (steward)	餐厅服务生
messman	餐厅服务生
laundryman(washman)	洗衣工
supernumerary	额外人员

PART 2 Various kinds of vessels(各种船舶)

air cushion craft	气垫船
barge-carrier	载驳船
boat	船;小船;艇
bulb-bowed ship	球鼻首船
bulk-carrier	散货船
cargo liner	定期货船
craft	船;艇;舰
crew boat	(船员)联络艇
diesel boat	柴油机船
drifter	拖网渔船
deck van ship	甲板集装箱船
drill ship	海底钻探船
dry cargo ship	干货船
dumb lighter	驳船(没有机器的)
electric motor ship	电动船
float on/float off ship	驳装式(集装箱)船
freighter	货船
fruit carrier	水果船
oil barge	油驳
ore carrier (ore ship)	矿砂船
packet	客船(短程高速)
partial container ship	部分集装箱船
passenger ship	客船
passenger liner	定期客船
raft	筏;木筏
reefer (refrigerator ship)	冷藏船;冻货船
ro/ro ship (ro-ro or ro-ro vessel or ship; drive in-drive off ship)	滚装船;自装自卸船
ro-ro/crane ship	有起重机的滚装船
salvage vessel(ship)	救助船;打捞船
sister ship	姊妹船
steamer	轮船

steam ship	蒸汽机船
store carrier	补给船
tanker (oil tanker)	油驳(油船)
tanker-container ship	集装箱油船
tramp	不定期货船;不定航线货船
collier	运煤船
combination ship	混合装运船
semi-container ship	半集装箱船
multi-purpose ship	多种用途船
container ship	集装箱船;货箱船
convertible container ship	可变换的集装箱船
scientific surveying ship	科学考察船
full container ship	全集装箱船
grain carrier	运粮船
hydrofoil (wing ship)	水翼船
ice-breaker	破冰船
lift on/lift off ship	吊装式(集装箱)船
junk	木帆船
large bulb ship	大球鼻首船
lash (lighters aboard ship)	子母船;载驳船
life boat	救生艇
tug	拖轮(拖船)
floating crane	起重船
floating dock	浮船坞
light ship	灯船
liner	班轮
LNG carrier (liquefied natural gas carrier)	液化天然气船
lumber carrier (timber carrier)	运木船
mail boat (mail liner)	邮船
meat ship	肉类船
motor ship (motor vessel = M.V.)	内燃机船
mixed or combination container	混合式或组装式集装箱船
nuclear powered vessel	核动力船
ocean-going ship	远洋船
ship	船;大船
trawler	拖网渔船
vessel	船;船舶
VLCC(very large crude carrier)	大型油船
ULCC(ultra large crude carrier)	超大型油船

PART 3 Names of the ship structure(船舶结构名称)

accommodation	房间(总称)
accommodation ladder	舷梯;关梯
after-peak	尾尖舱
air siren	气笛
aldis lamp	闪光信号灯
alleyway	走道
anchor	锚
anchor chain	锚链
auxiliary machinery	辅机
bilge	船底沟;污水沟
binnacle	罗盘支架
bitts(bollards)	系缆柱
block	滑轮;葫芦
boiler	锅炉
boiler room	锅炉间
boom	吊杆
bow	船头
port bow	左舷船头
starboard bow	右舷船头
break	甲板台阶
bridge	船桥;驾驶台;桥楼
brow	(从船上到岸上的)舷梯
bulkhead	滑轮跳板
bulwarks	舷墙
bunk	铺位
bunker	燃料舱
cabin	船舱;船上房间
passenger's cabin	乘客房间
pilot's cabin	引航员房间
owner's cabin	船东房间
spare cabin	备用房间
aerial (antenna)	天线
aft part (after part)	船尾部
cable	锚链
cable locker	锚链舱
capstan	绞盘
captain's bed room	船长卧室

captain's day room	船长休息室
captain's office	船长办公室
captain's saloon	船长接待室
captain's sea cabin	船长海上休息室
cargo hold	货舱
catwalk	狭窄的舷梯
awning	帆布篷
baggage room	行李房
barometer	气压表
basic line	吨位标志线
bath (room)	浴室
balk (baulk)	船梁
beam	船梁
hatch beam	舱盖横梁
port beam	左舷
starboard beam	右舷
berth	船上床位
chain locker	锚链舱
changing room	更衣室
chart room	海图室
coamings	舱口围板
cold storage	冷藏室
companion ladder	舷梯
control room	控制室
compass	罗盘;罗经
corridor	走廊
course recorder	航向记录仪
crane	起重机;吊车
crew's quarters	船员住所
dark chamber	暗室
davit	挂艇架;吊艇杆
deck	甲板
boat deck	救生艇甲板
lower deck	下甲板
lower tween deck	下二层柜
main deck	主甲板
poop deck	船尾上面的甲板
promenade deck	保护甲板之上甲板
shelter deck	遮蔽甲板

tonnage deck	量吨甲板
tween (between) deck	二层柜
upper deck	上甲板
upper tween deck	三层柜
deck department	甲板部
deck house	甲板室
derrick	吊杆
diesel engine	柴油机;内燃机
dining room(dining saloon, saloon)	餐厅
donkey boiler	副锅炉
double bottom	双层底
draught marks (draft marks)	吃水标志
drying room	烘干室;晾衣室
dynamo (generator)	发电机
echo sounder	测深仪
engine room	机舱;引擎间
engine room department	机舱部
escape trunk	逃出口;救生道
fan room	打风间
fender	靠把;碰垫
fire hose	灭火水龙带
firemen's department	生火部
flag-staff	旗杆
forecastle	船首堡;船首楼
forecastle head	船头甲板
foremast	头桅
forepart	船头部
forepeak	首尖舱
freeboard deck line	干舷甲板线
funnel	烟囱
galley	(船上)厨房
gangway	舷梯;跳板
gear	齿轮;传动装置;装备;用具
gentlemen's (room)	男厕所;男盥洗室
guy	稳索
gyro compass (gyro)	陀螺罗经
halliard, halyard	帆旗之升降索
hatch	舱口
hatch board	舱盖板

hatch coaming	舱口围板
hatch cover	舱盖
hawse hole	锚链孔
hawse pipe	锚链筒
hawser	船缆;锚链
helm	舵轮;舵柄
hold	货舱
hold lower	底舱
hull	船壳
jack ladder (Jacob's ladder)	软梯;绳梯
jackstaff	船头小旗杆
jigger mast	尾桅
jumbo (derrick)	重吊(杆)
keel	龙骨
ladies' (room)	女盥洗室;女厕所
laundry	洗衣房
lavatory	厕所
life belt	救生带
life boat	救生艇
life buoy	救生圈
life jacket	救生衣
life raft	救生筏
life-saving apparatus	救生设备
load line	载重线
lobby	门廊;大厅
locker	柜
lounge	休息室
mail room	邮件房
mainmast	主桅
man-rope	绳梯
mast	桅杆
mast house	桅楼
mess (mess room)	餐厅
crew's mess	水手餐厅;船员餐厅
duty mess	值班船员餐厅
officer's mess	高级船员餐厅
midships	船中部
mizzen mast	后桅
monkey island	瞭望台

chief engineer's officer	轮机长办公室
deck office	甲板部办公室
engineer's office	轮机部办公室
pantry	配餐间
passage	走廊
pillar	支柱
pilot ladder	引航员舷梯
pipe	管子
plimsoll mark	载重线标志
poop	船尾楼
port	港口;舱口;左舷
port-hole	舱口;舷窗
propeller	螺旋桨;推进器
propeller shaft	推进器轴
pulley	滑轮
pump	泵
purchase	绳索;滑轮
quarter	船的后部
port quarter	左舷后部
starboard quarter	右舷后部
radar	雷达
radio	无线电
radio direction finder	无线电测向仪
radio room	无线电室
radio transmitter	无线电发射机
rail	栏杆;扶手
railings	扶手;栏杆
rat-guard	缆绳上的挡鼠板
ratlines	绳梯横索
recreation room	娱乐室
refrigerated hold	冷藏室
rig	帆具
rigging	帆索
rudder	舵
saloon	大厅;接待室
screw	螺栓
cofferdam tank	隔离舱
deep tank	深水舱
fresh water tank	淡水舱

fuel tank	燃油舱
tarpaulin	盖舱油布
tent	帐篷
toilet	盥洗室
trunk	凸起舱口
turbine	透平机;涡轮机
turbine tube	透平管
tween screw	双推进器
valve	阀门
scupper	排水管
scupper board	挡水板
scanner	雷达扫描设备
sextant	六分仪
shaft tunnel	轴隧
shackle	钩环
shifting board	防动板;隔舱板
sick bay	病房
signal rocket	信号火箭
signal pistol	信号枪
signaling lamp	信号灯
single screw	单推进器
siren	气笛
sling	吊索
smoke room (smoking saloon)	吸烟室
starboard	右舷
stateroom	特别房舱;睡舱
steam engine	蒸汽引擎;蒸汽机
steerage	通舱;三等客舱
steering gear	舵机
stem	船头
stern	船尾
steward's department	乘务部;管事部
storeroom	贮藏室
tackle	滑车;吊具
tank	液体舱
ballast tank	压载水舱
ventilator	通风筒;风筒
wash port	舷墙排水孔
wash room	盥洗室

water closet (WC)	厕所
wheel	舵轮
wheel house	舵轮室
whistle	气笛
winch	绞车
winch house	绞车楼
windlass	起锚机
wireless room	电报室
W/T direction finder	无线电测向仪

PART 4 Special and correlative facility for ship repairing (修船专用及关联设备)

dockside traveling stage	船坞脚手架
aerial work platforms	高空作业车
sky elevator	升降作业车
high pressure water pumps	高压水泵
blaster	喷射机
high pressure water washer	高压水清洗机
movable high pressure cleaning system	移动式高压清洗机
sand blaster	喷砂机
inside blasting machine for pipe	管道内面研扫机
descaling machine	除锈机
blast nozzle	喷砂嘴
sweeper	清扫车
marine coatings/paints	船用油漆
airless spray coating equipments	无气喷涂机

PART 5 Special tools for ship repairing (修船专用工具)

hydraulic hand pumps	手动油压泵
hydraulic jacks	油压千斤顶
hydraulic press frame	液压顶支架
air grinders	气动砂轮机
air drill	气动钻
appers	攻螺纹机
files, saws	气动锉、气动锯
air millers	气动刨铣机
air wrenches	气动扳手
air hoists	气动葫芦

spring balancers	弹簧平衡器
air chippers	气凿
scaling hammers	除锈锤

PART 6 Docking(坞修用语)

propeller to be brushed in sites	车叶原地刷清
tightness to be checked during undocking	出坞时核查紧固度
valves to be repacked and refitted	各阀重新填料并装复
tail shaft to be drawn out for inspection	尾轴退出检查
lignum vitae to be renewed if necessary	铁梨木必要时换新
electric power 380 V /50 Hz/200 A and fresh water to be supplied	供应 380 V/50 Hz/200 A 交流电及淡水
sea valves, overboard discharge valves and cleaned and ground in	海底阀、出海阀、通海接头阀打开清洁磨合
sea chests to be opened up , cleaned and applied with two coats A/C paint	海水箱打开清洁涂两度防腐漆
zinc plates to be renewed	锌板换新

PART 7 Troubles(表示故障的词语)

beyond repair	已无法修复
over-sized	尺寸过大
slow function	反应缓慢
out of order	不正常
not up to standard	不合标准
inaccurate	不准确
ineffective	失效
out of function	失去作用
seized	粘着
stuck fast by icing	冰冻结住
over heated	过热
excessive wear	过度磨损
excessively worn out	过度磨掉
worn away	过度磨掉
a little bit inclined	有一点倾斜
abnormal	不正常
destroyed by overheating	因过热而毁坏
chapped	龟裂
collapse	塌陷
out of operation	运转失灵

oval	呈椭圆形
scored	拉痕
scuffed about 6 mm×7 mm in area	拉毛面积约 6 mm×7 mm
deformed	变形
deformed over a length of 3 mm	变形超过 3 mm
loose	松动
greasy	油污
dirty	肮脏
stuck	咬住
squeezed	挤压
bent	弯曲
faulty	故障
frosted	结霜
damaged	损坏
broken into pieces	破裂成片
partly detached	部分剥离
partly blocked	部分阻塞
violent vibration	剧烈振动
low efficiency	效率不高
twisted	挠曲
burnt	烧坏
choked	堵塞
fractured	断裂
earthed	接地
knocking	敲缸
leaking (leaky)	漏泄
melted away	溶化
reduced about 12 mm	缩减约 12 mm
jammed up in the cylinder	在气缸内卡住

PART 8 Dismantling(表示拆卸的相关词语)

to be taken out from ring groove	从环槽中取出
to be opened up for inspection	打开检查
to be shrunk (softened) with dry ice	用干冰拧松
to be untightened by heating	用加热放松
to be lifted out	吊出
to be turned out	转出
to be dismantled	拆卸
to be withdrawn	退出

to be loosened	拧松
to be unscrewed	拧开
to be drawn out	拔出
to be pulled out for inspection	拔出检查
to be dismounted	卸下
to be pulled off	拉去
to be taken off	拆下
to be turned (rolled) out	转出
to be extracted by drilling	钻孔拔出
to be removed	移开
to be disconnected	脱开
to be disengaged	解脱
to be disassembled	解体
to be overhauled	解体检修
to be ranged out	解开排好
to be turned over	翻转

Assembling(表示安装的相关词语)

to be tightened up to the proper tension	上紧至一定的紧度
to be covered with asbestos wrapping	包以石棉
to be reassembled with new packings	用新的填料重新安装
to be refitted with new packings	用新的填料重新装复
to be retightened by hydraulic pressure	用液压重新上紧
to be reinforced by adding a support	加装支柱以加强
to be pressed into	压入
all removals to be refitted as original	所有拆下部件按原样安装
to be re-expanded	重新扩管
to be refastened	重新搞紧
to be reassembled	重新组装
to be rethreaded	重车螺纹
to be restored	重新堆装
to be fitted back according to instruction	按说明书装复
to be preserved with cement wash	涂水泥浆
to be connected	接好
to be dressed up	装饰
to be inserted with good contact	嵌入至良好接触
to be installed in position	装至原位
to be installed and proved workable	装好并能使用
to be mounted	装上

to be fixed up	装好
to be boxed up in good working order	安装至良好工况
to be repacked after fitting back	装复后重新填料
to be fastened	搞紧
to be easy going	需易于拆装
to be closed up in good order	需封闭完好
to be closed up in the presence of C/E	需轮机长在场时封闭
to be sealed in the presence of C/E and surveyor	需轮机长和验船师在场时封闭

PART 9 Inspecting(表示检查的相关词语)

to be opened up for inspection	打开检查
to be checked completely	全部核查
to be examined	检查
to be detected for leakage	查漏
to be checked according to the instruction book	按说明书核查
to be re-checked	重新核查
to be re-inspected	重新检查
to be checked for alignment	检查对中
to be checked after assemblage	装配后检查

PART 10 Testing(试验相关用语)

to be tested in running condition	在运转情况下试车
to be tested under pressure of 6 atmospheres	在六个大气压下进行试验
to be tested by means of blue oil	做蓝油试验
to be tested hydraulically(to be hydraulic-tested)	做液压试验
to be pressure-tested	做压力试验
to do magnetic powder testing	做磁力探伤
run-in test to be applied (carried out)	做磨合试验
dye test to be applied	做染色探伤
color test to be carried out	做染色试验
load trial to be carried out	做负载试车
to be dynamically balanced	做动平衡试验
to be subjected to dynamic balance test	做动平衡试验
to be statically balanced	做静平衡试验
to be subjected to static balance	做静平衡试验
blue oil test to be carried out	进行蓝油试验
pressure test to be applied for leakage	进行压力试验查漏
operation test to be carried out (performed)	进行操作试验
smoke test to be carried out	进行烟熏试验

load test to be carried out 进行负载试验
to be verified 证实
to be tested for leakage 试验漏泄
to be tested to prove tightness 试验紧固度
to be tested according to the specifications 按规范进行试车
to be retested after necessary repair 修理后重新试车
to be surveyed 检验
to be subjected to hydraulic test according to the requirements of the instruction book 根据说明书要求做液压试验
to be subjected to sea trial with maximum rpm for two hours 船舶在最大航速下试航两小时
to be subjected to running test after reassembling 装复后做运转试车
to be tested by sighting 照光试验
to be tested in order 需试验完好

PART 11 Measuring(表示测量的相关词语)

measurement to be taken with bridge gauge 用桥规测量
to be measured with calliper 用卡尺测量
to be measured by means of ultrasonic instrument 用超声波仪器测量
clearance to be measured by means of lead wire 用压铅丝测量间隙
to be gauged by means of micrometer 用千分卡测试
to be measured for elongation 测取延伸率
to be measured for thickness 测量厚度
to be calibrated 校正
to be recalibrated 重新测校
crank shaft deflections to be measured before and after repair 修理前后测量拐挡差

PART 12 Adjusting(表示调整的相关词语)

to be adjusted by means of lead wire 用压铅丝方法调整
to be rectified on the lathe 在车床上矫正
to be adjusted according to the instruction book 按说明书调整
to be re-adjusted within the limit of 0.2 mm 重新调整至 0.2 mm
to be rebalanced 重新找平
to be aligned up 对中
to be re-aligned 重新对中
to be adjusted to 300 N/mm^2 to open and 310 N/mm^2 to close 调整至 300 N/mm^2 开启,310 N/mm^2 关闭
to be rectified after welding 焊接后进行矫正

PART 13 Cleaning(表示清洗的相关词语)

to be cleaned internally	内部清洗
to be cleaned with chemical compounds	化学清洗
to be cleaned with soda solution	用苏打溶液清洁
to be washed with fresh water	用淡水清洗
to be flushed with sea water	用海水冲洗
to be blown with compressed air	用压缩空气吹洗
slops to be disposed of	处理掉废油污水
to be air-blown	吹风
to be cleaned away thoroughly	彻底清除
to be derusted by chipping	敲铲除锈
to be descaled	除垢
oil sludge and sediment to be dug and removed	挖掏油渣沉淀
to be scraped and repainted	铲刮重漆
loose cement to be scraped out	铲除脱落水泥
ashes (sludge) to be cleaned off	清除灰渣垃圾

PART 14 Machining(切削加工相关词语)

to be faired up on the lathe	上车床平顺
to be machined to roundness	车成圆度
to be skinned (skimmed) up	车光洁
to be smoothed	车光洁
to be machined (faced up)	光车
to be machined to size	光车至规定尺寸
to be machined to order	光车至所需要求
to be polished to mirror surface	抛光至镜面度
to be surface-finished	表面光洁
to be finished to roundness on spot	原地车圆
to be lathed and slotted	光车开槽
to be drilled and taped	钻孔攻丝
to be drilled out	钻出
to be milled and chamfered	铣槽倒角
to be tapered before fitting back	装复前车成锥形
to be honed and polished	镗磨光滑
to be bored to roundness	镗圆

PART 15 Fitting(钳工用语)

to be ground to the seat	与阀座磨合

to be ground with lapping compound	用研磨剂研磨
to be smoothed with a file	用锉刀光滑
ridges to be filed off	凸起部分需锉掉
to be faired up in way of fracture	平顺断裂部位
to be fitted and scraped	拂刮
to be ground smoothly	研磨光滑
to be ground to bare metal	研磨出白
to be reground	重新研磨
to be chipped to bare metal	敲铲出白
to be freed up	除掉
to be brushed	刷
to be ground in sites	原地研磨
to be hardened up	紧固
to be sand-blasted to bare metal	喷砂出白
to be gouged out	刨削
to be ground in	磨合

PART 16 Welding and heat treatment(焊接和热处理用语)

to be newly moulded with cast iron	用铸铁新铸
to be built up by stainless steel welding	用不锈钢堆焊
to be closed up by electric welding	用电焊封闭
to be veed out and welded	开 V 形槽焊接
to be electric plated	电镀
to be tempered	回火
to be treated by tempering	进行回火处理
to be treated by annealing	进行退火处理
to be re-welded	重焊
to be re-metalled	重浇白合金
to be rebabbited	重新浇巴氏合金
to be annealed	退火
to be built up by welding	堆焊
to be coated with chromium	涂铬
to be heat-treated	热处理
to be welded	焊接
to be patched up by welding	焊补
to be quenched	淬火
to be cropped off	割补
to be nickel-plated	镀镍
to be chromium-plated	镀铬

to be galvanized	镀锌
to be forged	锻造

PART 17 Painting(油漆用语)

to be repainted with A/C paint	重涂防腐漆
to be given two coats of A/C paint	涂两度防腐漆
to be painted with red lead	涂以红丹漆
to be applied with one coat of A/F paint	涂一层防污漆
to be touched up with anti-rust paint	涂以防锈漆
to be sprayed with insulation paint	喷绝缘漆

PART 18 Electricity(电气相关用语)

mica to be undercut	云母拉槽
to be wrapped in insulator	包以绝缘物
drop test of all windings to be carried out	对所有绕组进行冲击试验
to be megger-tested	进行高阻抗试验
balancing test of armature to be carried	进行电枢平衡试验
high voltage test to be performed	进行高压试验
over-current test to be performed	进行过电流试验
trial to be carried out as follows	进行如下试车
run in full load 4 hours	满载运行 4 小时
run in half load 2 hours	半载运行 2 小时
run in over load (10%) 1 hours	过载 10%运行 1 小时
to be rewound	重绕
to be revarnished	重浸凡立水
to be re-insulated	重新绝缘
to be insulated	绝缘
to be varnished	浸凡立水
to be dipped with insulation paint	浸绝缘漆
to be immersed with insulation paint	浸绝缘漆
to be impregnated with insulation paint	浸绝缘漆
to be baked and dried	烘干
to be routed	排线
heavy current	强电
light current	弱电
monitor	监视
generator	发电机
alternator	交流发电机
prime mover	原动机

battery	蓄电池
illumination	照明
main switchboard	主配电板
distribution panel	分配电板
shore power box	岸电箱
overload	过载
reverse power	逆功率
under voltage	欠电压
preference trip	优先卸载
switch over	转换
remote control	遥控
switch on	合闸
switch off	分断
unload	卸载
out of service	解列,退出供电
constant voltage	恒压
in parallel	并联
phase sequence (angle)	相序(角)
regulator	调整器
load test	负荷试验
control unit (component)	控制装置(元件)
contactor	接触器
relay (pressure, temperature, level)	(压力、温度、液位)继电器
thermostat	恒温器
master controller	主令控制器
sensor	传感器
dynamic-pressure type	水压式
indicator	显示器
magnifier	放大器
converter	变化器,换能器
rectify	整流,滤波
level gauge	液位计
thermometer	温度计
solenoid	电磁阀
interlock	互锁
rheostat	变阻器,电阻箱
printed wiring board	印刷电路板
led = light emitting diode	发光二极管
potentiometer	电位计, 分压计

servomotor	伺服电动机
self excitation	自励
compound excitation	复励
resistor	电阻器
capacitor	电容器
reactor	电抗器
transformer	变压器
heat-resisting cable	耐热电缆
armored cable	铠装电缆
shielded cable	屏蔽电缆
cabtyre cable	橡胶绝缘软电缆
anti-explosion lamp	防爆灯
arc shield	灭弧罩
ACB(automatic circuit breaker)	自动空气断路器
ballast	镇流器
alkaline battery	碱性蓄电池
electrolyte	电解液
evaporator	造水机
explosion proof motor	防爆电机
ebonite	胶木,电木
earth-fault protection	接地保护
bearing pedestal	轴承座
blinker lamp	闪光信号灯
bus bar	汇流排
buzzer	蜂鸣器
cable conduit	电缆管道,导线管
cable laying	电缆敷设
cathode protection unit	阴极保护装置
centrifugal switch	离心式开关
change-over switch	转换开关
chip	芯片,集成电路
converter	变流机
counter	计数器
cowl	通风罩
current transformer	电流互感器
duty cycle	负载持续率
neutrals	中性点
float switch	浮动(子)开关
fog horn (whistle)	雾笛

fuse base	熔丝座
gangway lamp	舷梯灯
germicidal lamp	杀菌灯
glow-starter	辉光启动器
governor	调速器
effective power	有效功率
ignition coil	点火线圈
integrating circuit	积分电路
lead-acid battery	铅酸蓄电池
keyway (key slot)	键槽
load transfer	功率转移,负荷转移
magslip	旋转变压器
main-frame	总配线架,主机架,底盘
maintenance	维修保养
mercury vapour lamp	水银灯(汞气灯)
movable (static) contact	动(静)触头
operating system	操作系统
PCB = printed circuit board	印刷电路板
periodic repair	定期维修
photoswitch	光控开关,光控继电器
plug	插头
socket	插座
potential	电势
pre-exciting switch	充磁开关
probe	探头,探测器
rated capacity	额定容量
reactive current	无功功率
reduced-voltage starting	降压起动
resilient coupling	弹性连接
resonance	谐振
rewire	重新接线
shaft-turning gear motor	盘车装置电动机
thermocouple	热电偶
thermo-switch	温度开关
winding overheat	绕组过热
compensator	补偿器
relative permeability	介电常数
screened	有屏蔽
unscreened	无屏蔽

PART 19 Motor and alternator(电机和发电机)

arcing	(电)击穿
bake	烘烤
bearing cap (cover)	轴承盖
bearing housing	轴承座
brazing	铜焊
brush gear	电刷装置
cleaning agent	清洁剂
clearance	间隙
coil	线圈
commutator	换向器，转接器
core	铁心
electric cleanser	电气清洁剂
heater	加热器
insulator	绝缘子
interpole	换向极
metal plating	金属涂镀
rotor	转子
self-cooling	自冷
series coil	串激线圈
shaft sealing ring	轴封
shunt	并激
sleeve	套,筒
stator	定子
varnish	浸漆
winding	绕组

PART 20 Illumination(照明)

searching light	探照灯
projector	投光灯
navigational light	航行灯
signal light	信号灯
portable light	手提灯
fluorescent light	荧光灯
cabin ceiling light	舱顶灯
anchor light	锚灯
mast light	桅灯
stern light	尾灯

side light	舷灯
flash signal light	闪光信号灯
emergency lighting	应急照明

PART 21 Navigation and communication equipment (导航及通讯设备)

compass (magnetic ~)	罗经(磁罗经)
gyro	陀螺仪
steadiness	稳定性
radio wave	无线电波
anemoscoper	风速仪
antenna	天线
accelerometer	加速计
log	计程仪
speed servo system	速度随动系统
range display	航程显示器
calculator	计数器
sensibility	灵敏度
transmitter	发射机
receiver	接收机
sounder	测深仪
fathometer	测深仪
echo sounder	回声测深仪
impulsator	脉冲发生器
dial	刻度盘
medium wave (short ~)	中波(短波)
radio station	电台
transceiver	收发报机
teleprinter	电传打字机
intercommunication	内通
sound power telephone	声力电话
automatic telephone	自动电话
acoustics	音响效果
direct telephone	直通电话,对讲电通

PART 22 Verb phrases(常用动词短语)

arise from	由……引起
as for	就……而言

as well as	以及……
be capable of	具有……的能力
be contrary to	与……相矛盾
be coupled with	与……连接
be equipped with	装备有……
be in service	在使用中
be ready to	准备好……
be related to	与……有关
be situated at	位于
be specialized in	专门从事
be suitable for	适合于
case by case	视情况而定
check on spot	现场定夺
comply with	符合,遵循
consult with sb.	与某人商量
fasten sth. to	将某物固定于……
go from bad to worse	越来越差
have a close look at	仔细检查
have much to do with	与……有很大关系
in place of	代替
in short	简而言之
in the absence of	缺少,缺乏
keep (stop) sth. from	防止
make up	弥补
match with	与……相匹配
on the contrary	相反
short form	缩写
take precautions	采取预防措施
take…into account	把……考虑进去
the former, the latter	前者,后者
to make improvement upon	改善
vary with	随……而不同
within the limitation of	在……的限度内
to be handed over to C/E in duplicate (two copies)	一式两份交轮机长
to be handed over to C/E in fourfold (four copies)	一式四份交轮机长
to be sent to C/E	送交轮机长
to be submitted to C/E	呈轮机长
to be prepared for survey	以备检验
to be supplied by yard	厂供

to be remedied by means of meta-lock	用波浪键修补
to be replaced with ship's spare	用船上备件替换
to be jacked up	用千斤顶提起
certificates to be issued	出具证书
survey report to be issued	出具检验报告
to be charged	充
to be filled with CO_2 gas	充以 CO_2 气体
to be transported to	运至
to be cancelled	取消
to be provided	供应
to be presented for surveyor's inspection	供验船师检验
all bottles to be calibrated	所有钢瓶测试
to be made and supplied	制造并供应
to be fabricated and installed according to the existing one	按现有的制作并安装
to be defrosted	除霜
to be paved	砌
to be refilled with Freon 12	重充氟利昂 12
to be recharged with mercury	重充水银
to be removed/sent to	送至
to be sent/transferred to workshop for repair	送车间修理
to be to ship as spare	退回船上作备用
drawings to be made and submitted to ship	绘制图纸交船
to be repaired as required	按要求修理
to be treated as items 302	按 302 项处理
to be renewed	换新
to be eliminated	消除
to be blinded during repair	修理时用盲板封口
to be shifted to	移至
to be supplied by ship	船供
to be supplied by owner	船舶所有人供应
to be patched up by welding	焊补
to be furnished	提供
to be supplied as spare	提供作备件用
to be cut off	割掉
to be newly made as per sample	照样新做
to added	增加

PART 23 Useful prepositional phrase(常用介词短语)

about 35 mm in length	长度约 35 mm
about 80 mm×90 mm in area	面积约 80 mm×90 mm
according to the instruction book	根据说明书
according to the C/E's instruction	根据轮机长指示
after being annealed	退火后
after being ground	研磨后
after being machined	精加工后
after being welded	焊接后
after completion	完工以后
after repair	修理以后
as follows	如下
as necessary	按需要
as per sample	按样品
as required	按要求
as spare	作备件
before repair	修理以前
before test	试验以前
between fly wheel and generator	在飞轮和发电机之间
by means of metal-lock	用波浪键的方法
by means of lead wire	用压铅丝方法
by owner	由船舶所有人
by yard	由船厂
for inspection	(为了)检查
for examination	(为了)仔细检查
for repair	(为了)修理
for perfect cleanness	(为了)彻底清洁
if found	如果发现
if necessary	如果必要
in (good) order	妥善
in good working order (condition)	至良好工况
in running condition	至运行工况
in normal order	至正常
in duplicate (two copies)	一式两份
in triplicate (three copies)	一式三份
in the presence of sb.	某人在场的情况下
in position	就位
in sites	原地

in place of	在某个部位
on board	在船上
on completion	在完工时
on the spot	就地
over a length of 35 mm	长度超过 35 mm
to the satisfaction of sb.	使某人满意
to mirror surface	至镜面度
to chief engineer	交轮机长
to ship	交船
to workshop	至车间
to original place	至原来地方
to service order	至使用工况
to proper tension	至适当紧度
to proper relief pressure	至适当释放压力
to standard size (dimensions)	至标准尺寸
up to bare metal	出白
under being preheated	在预热情况下
under various condition of engine load	在机器不同负荷下
under normal sea service load	在正常海上运行负荷下
with ship's spares	用船上备件
with owner's spares	用船舶所有人的备件
with chemical compound	用药剂
with fresh water	用淡水
with sea water	用海水
with compressed air	用压缩空气
with red lead	用红丹
with one coat of anti-rust paint	以一度防锈漆
with two coats of anti-fouling paint	以两度防污漆
with three coats of anti-corrosive paint	以三度防腐漆

PART 24 Caution(告诫用语)

Caution/Look out	注意
No smoking	禁止吸烟
Danger	危险
Poison	有毒
Exit/Way out	出口
Entrance	进口
No admittance	禁止入内
Keep off	切勿靠近

Keep out	切勿入内
Road closed	止步(此路不通)
Push	推
Pull	拉
Hands off	勿动手
Wet paint	油漆未干
Keep dry	防止潮湿
Away from boiler and engines	禁止放在机炉舱附近
Keep in the sun	置于阳光下
Keep out of the sun	勿露于阳光下
Keep cool	保持阴凉
Fire gate	火灾太平门

PART 25 Safety(安全用语词汇)

extinguisher	灭火器
fire hose	消防水带
fine	罚款
gas-mask	防毒面具
respirator	吸呼器
venerations	中毒
suffocation	窒息
oxygen depletion (lack of oxygen)	缺氧
explosion	爆炸
plump	坠落
receiving an electric shock	触电
accident	事故
drug & alcohol testing	药物和酒精检查
alcohol tester	酒精检查仪
safety standards	安全标准
general safety rules	安全通则
life saving and fire fighting equipments	救生和灭火设备
lifeboats	救生艇
enclosed spaces	密闭空间
oxygen deficiency	缺氧
hydrocarbon vapors	碳氢气体
toxic vapors	毒气
safe for entry criteria	安全进入许可值
safety precautions during entry	进入期间的安全措施
atmosphere monitoring	空气监控

fire protection and emergency response	防火及紧急措施
hot work requirements	动火的要求
burning and welding	点火与焊接(动火)
fixed fire extinguisher	固定灭火器材
fire plug	消防栓
coupling	接头
fire hose	消防水带
fire fighting gun	消防水枪
automatic sprinkler	自动喷水器
CO_2 releasing hole	CO_2 释放孔
CO_2 steel bottle	CO_2 钢瓶
dry powder fire extinguishing system	干粉灭火系统
dry powder fire extinguisher	干粉灭火器
high-pressure main pipe	高压总管
overflow valve of dry powder	干粉溢流阀
pressure gauge	压力表
pressure reducing valve	减压阀
discharging pipe	释放管
safety valve	安全阀
high expansion foam generator	高膨胀泡沫发生器
foam concentrate container	泡沫液容器
portable foam fire extinguisher	手提泡沫灭火器
duckbill type portable CO_2 fire extinguisher	鸭嘴式手提 CO_2 灭火器
1211 fire extinguisher	卤代烷(1211)灭火器
nozzle	喷嘴
handcart type foam fire extinguisher	推车式大型泡沫灭火器

PART 26 Other words (其他词汇)

general manager	总经理
manager	经理
ship repair manager (SPM)	总管
supervisor	主管
operation head	作业长
foreman	领班
hull workshop	船体车间
tug & transportation workshop	起运车间
electric workshop	船电车间
dock workshop	坞修车间
machinery workshop	轮机车间