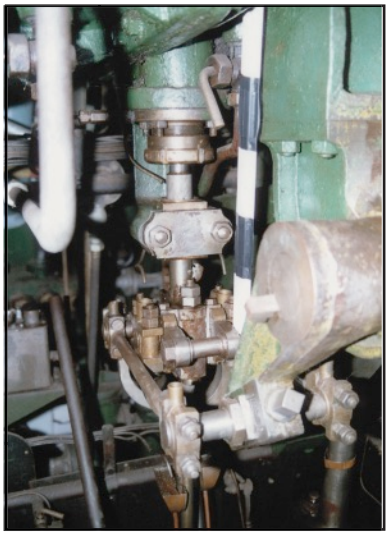
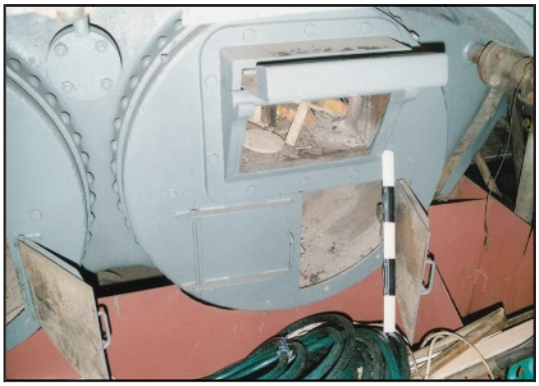
Odra Steam Tug

Nadbór

Report on condition, restoration and possibility of operating the engine for display purposes.

Survey undertaken September 2000





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Two views of Nadbór. Above at work on the Odra in the 1950s and below at her present mooring in Wroclaw.

NADBÓR
Conservation Report

Introduction

The steam tug Nadbór is currently moored outside the Technical University in Wroclaw where it is used both as an office for the Technical Monument Study & Documentation Office (TMSDO) and as a lecture and exhibition room.

The 'Nadbor' was part of a 30 million Dutch guilder Polish-Dutch commercial treaty signed on December 18, 1946, for the purchase of tugs for the Oder River. The contract for delivery of these tugs was signed on April 30, 1947, and the whole contract had been completed by 1949. Nine tugs of 500 HP and thirteen tugs of 250 HP were built and they entered service on the canalised section of the Oder River: Gliwice - Kozle - Wroclaw. 'Nadbór' belongs to the second group.

Sister-ships of the "Nadbór" were: "Swiatopelk" (The first to be completed. Its name was used to identify the whole class - "Swiatopelk"), "Bozydar", "Bozymir", "Bronisz", "Chwalislaw", "Jurand", "Mestwin", "Msciwój", "Nadbór", "Radoslaw", "Scibor", "Zbyszko", "Sedziwój". Hull and superstructure were fabricated at the Bijkers Maatschapij shipyard in Gorinchem (builders No. 19 / 266 / 115), and the main engines and auxiliary machinery were built by N.V. Boeles Scheepswerven Maschinenfabriek (builders No. 120). The main dimensions of the tug are as follows: length - 28.0 m., breadth - 6.60 m., depth - 2.10, minimum headroom - 3.90 m., draught - 1.10 m. In 1954, the Polish shipyard in Kozle built two additional tugs to the Dutch drawings. They were named "Bogumil" and "Boguslaw". They differed from the Dutch tugs in some aspects e.g. a rounded stern was built instead of the angular stern of the Dutch tugs.

From 1949 to 1965, 'Nadbór' was engaged on towage of barges on the Odra between Kozle (and Gliwice) and Wroclaw. After withdrawal from commercial service, she was used as a floating boiler room in the Repair Base of the Odra Steamship Company from 1968 till 1975. Later (in late 1970s), the tug was used as a power station at a hydro-engineering site in the former Czechoslovakia (on the Elbe), and for this purpose, a generating set and electric power distribution station were installed in aft crew compartments.

After returning home in 1982 a trial was undertaken using the tug as an ice-breaker in region of the Wroclaw Waterway Authority. Its conversion to an ice-breaker was completed on December 10, 1982. However, it soon become obvious that the tug was not suitable for icebreaking because of its stem shape. Finally, in 1983, the tug put into storage at "Osobowice I". In 1986 / 87, through the initiative of Mr Marian Szwarc, the PP "Zegluga na Odrze" (Odra Steamship Company) decided to preserve the tug. In 1992, PP "Zegluga na Odrze" was transformed into the ODRATRANS S.A. company which has given the tug, with specific agreements, into the care of the Foundation of Open Museum of Technology.

Hull

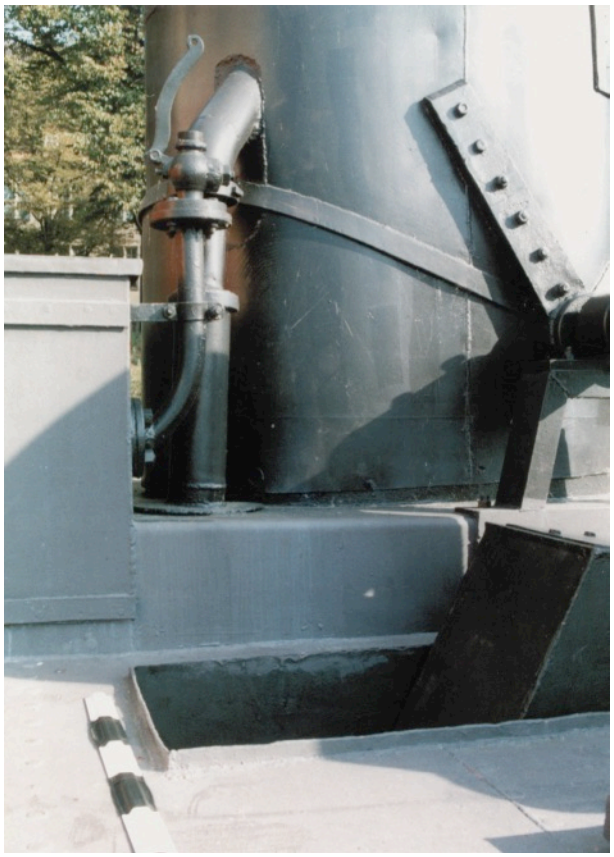
Structurally, the hull is in good condition and it has been grit blasted and painted. There are many signs of alteration and repair. These should be recorded as they, together with other similar details elsewhere, will allow the interpretation of the tugs operating life and history.

Superstructure - external

The superstructure was in a poor condition prior to acquisition by the TMSDO. It was grit blasted and painted at the same time as the hull which has reduced corrosion problems dramatically. Several alterations to the superstructure can be found by examination. Window sizes have been altered and elsewhere there are signs of more recent welding. These alterations should be recorded to build up the detailed history of the tug.

The wooden wheelhouse has been replaced using new timber. The ventilator windows over the engine are in reasonable condition, though the catches which hold them in the open position need fitting where they have been removed. The sliding panels allowing ventilation of the boiler room are all immovable because of the grit from blasting and from damage over the years. These should be cleaned and made free as they are a source of corrosion in their present condition. Fittings should be attached to the inside to allow them to be locked closed. The missing portholes need to be fitted to the engine room to stop the weather from affecting the condition of the engine.

The towing equipment needs some work to ensure that everything is free and in working condition. The guide over the rear deck has been removed for safety reasons. The steering gear is not in good order and needs to be stripped down and rebuilt to ensure that it does not corrode and that it operates easily.



The base of the funnel showing the whistle fitting and the recess for the counter-balance weights. The drains for the recess should be kept clear to allow water to run off and not cause corrosion.

The steering drive which needs checking and cleaning so that the gears and shafts operate smoothly.

All the various openings, access points and ventilators shown in these photos need checking and freeing where necessary. It is important to keep rain and snow out of the engine and boiler room as well as the other cabins.

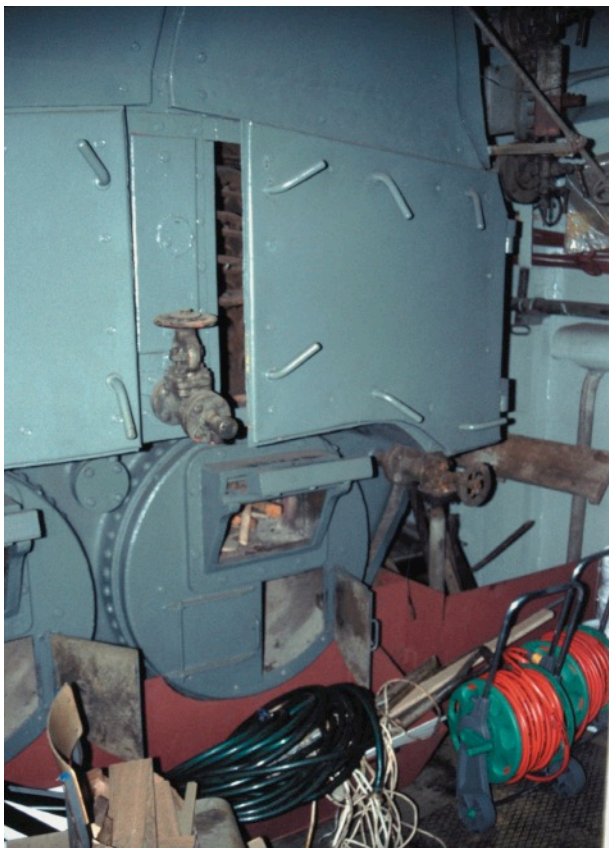
Superstructure - internal

Both the captain's and crew's accommodation has been removed as it was in poor condition and had been radically altered (particularly the crew's quarters) when the tug was used on the Elbe. These areas now form office and exhibition space.

The engine room and boiler room have not been drastically altered and are in reasonable condition. Some cleaning, tidying and painting will be needed after the engine and boiler have been conserved. There is much evidence of the grit used in blasting the hull, and this should be removed. In particular, the bilges should be examined and any rubbish and grit removed to ensure minimum corrosion. This is also beneficial with regard to examination of the condition of the hull.

Engine room and boiler room - general

Grit from blasting has covered most of the machinery. It should be carefully removed, particularly from bearing surfaces and from around bearings. By regular cleaning over a long period, most of the grit should be removed.

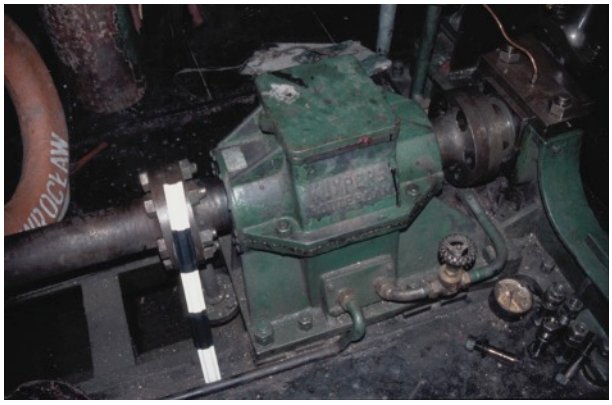


Two general views of the engine room and boiler room.

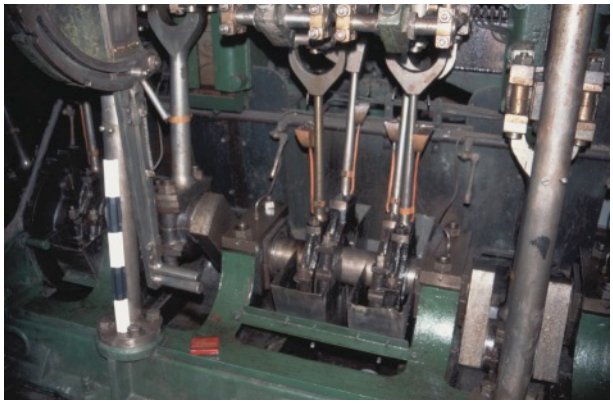
Engine

The thrust bearing was partially dismantled and the propellor shaft disconnected from the engine. This was to ensure that the main stern gland as it could do if the shaft was turned. The stern gland was greased afterwards, and a the gland should be greased every few months to ensure that it remains water-tight and in good condition. The thrust bearing itself was full of grit as the fixing studs for the cover had been removed, leaving the top of the bearing somewhat unprotected from dirt. A considerable amount of grit was removed and the thrust plates cleaned, but the oil reservoir was not touched and it will definitely contain much grit and dirt. This needs to be removed before the engine is turned over regularly.

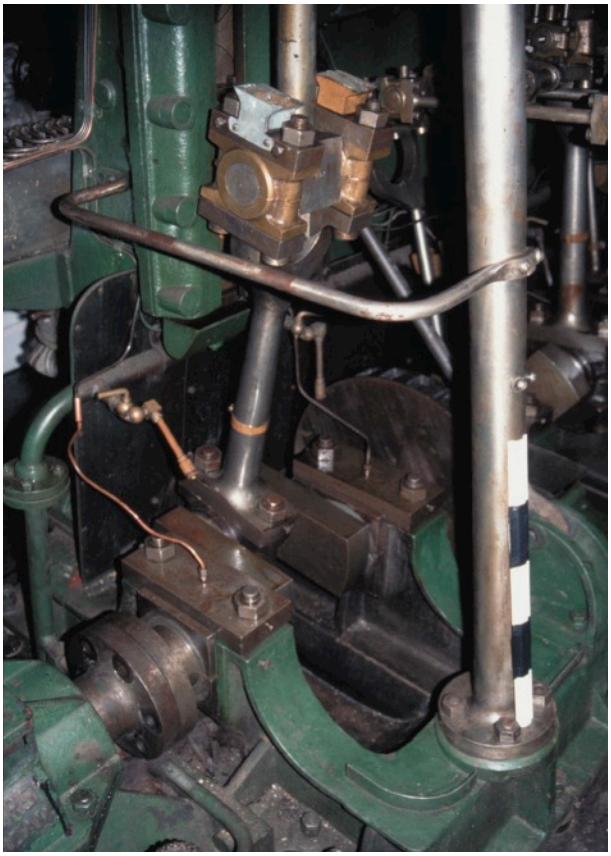
On the engine, the main bearing next to the thrust block was dismantled, as was the adjacent



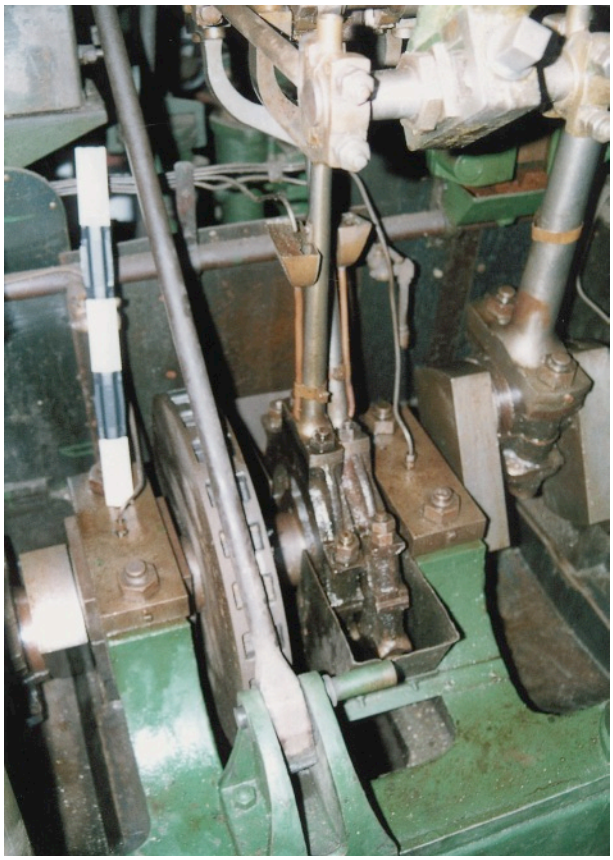
The thrust block and the coupling which was disconnected.



The high and intermediate connecting rods and valve gear with the reversing gear on the left.



The bearings which were dismantled and the disconnected propellor shaft coupling.



The barring disc and lever.

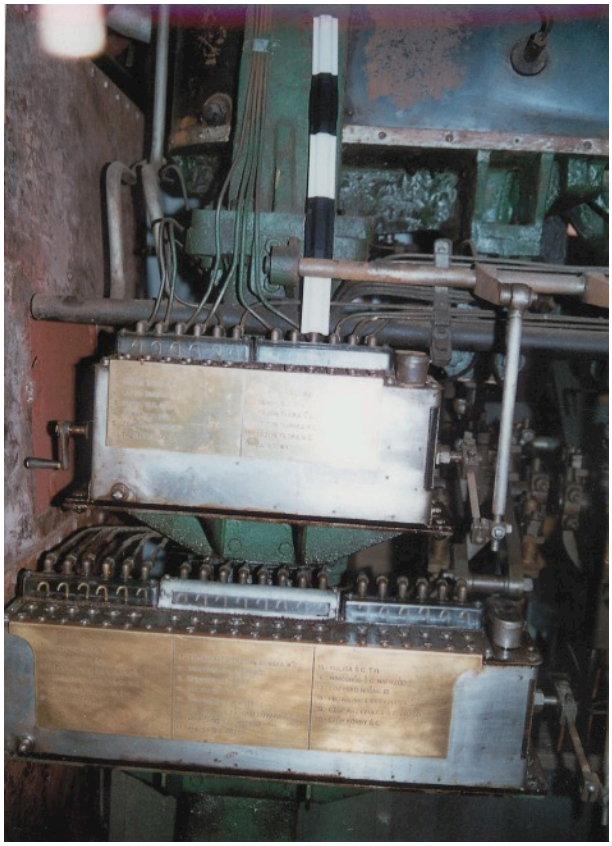
cross-head bearing. There was some wear on both the journals and the bearings, the former also having slight rusting. However, their condition appeared suitable for operating the engine for demonstration purposes.

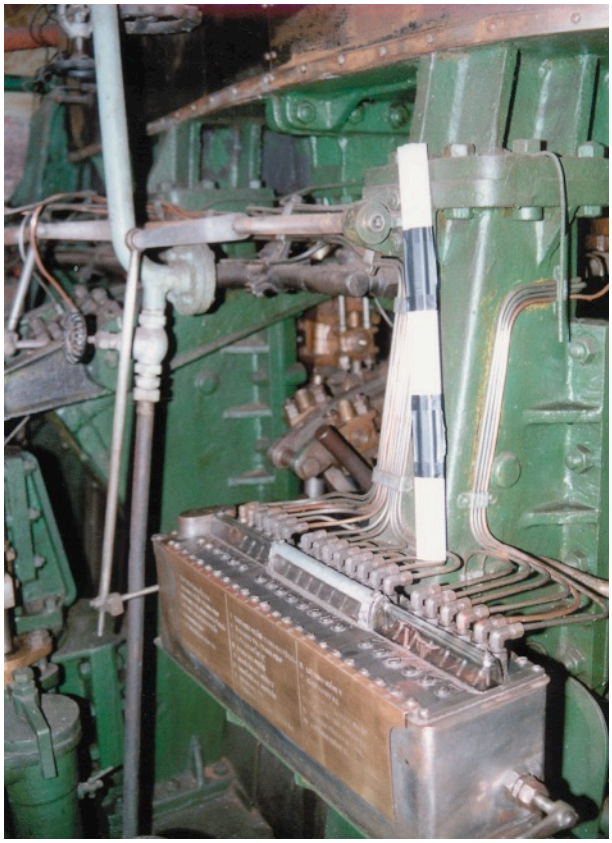
The whole lower end of the engine was cleaned using engine oil and paraffin in an effort to remove as much of the grit as possible. However, further cleaning and dismantling will be necessary to ensure that grit has not reached the other bearings. After cleaning with the light engine oil, heavier oil was applied as a preservative. This should be applied regularly to prevent rusting.

The low pressure cylinder cover was removed and some oil applied to the piston rings. The other pistons should be similarly treated. The cylinder walls will be the major source of friction when rotating the engine, so every effort should be made to ensure that they are free from rust and well lubricated.

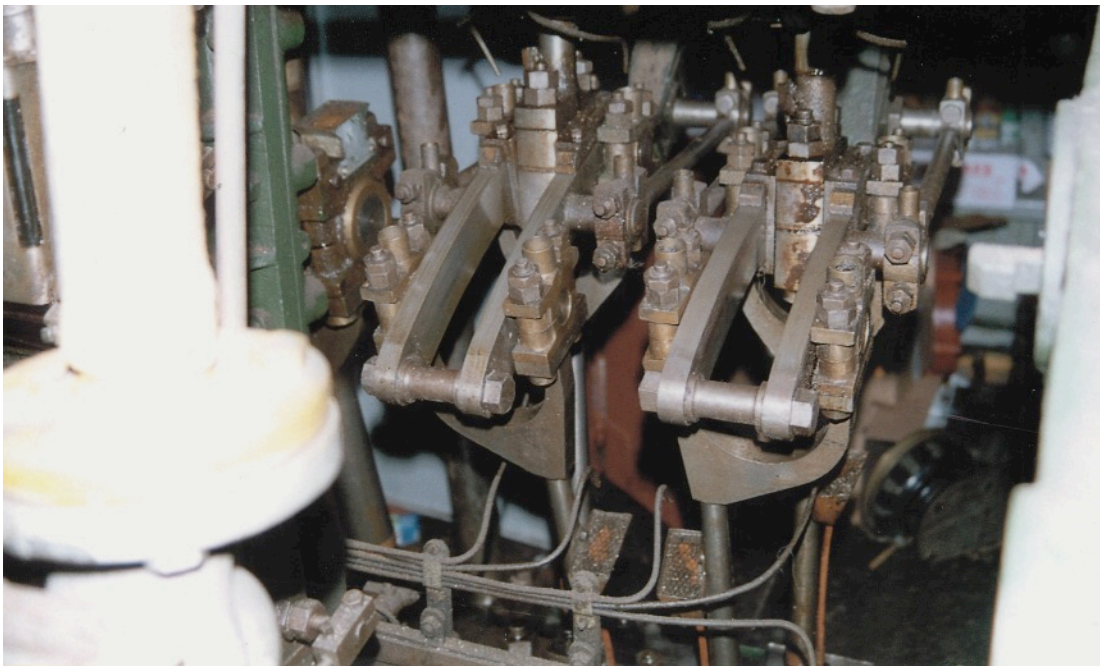
There are three lubricators, two for the lower bearing surfaces and the third supplying steam oil to the pistons and slide valves. Some of the pipework has been damaged and needs replacing. Other pipes may be blocked. The whole system needs checking to ensure that the engine is well lubricated.

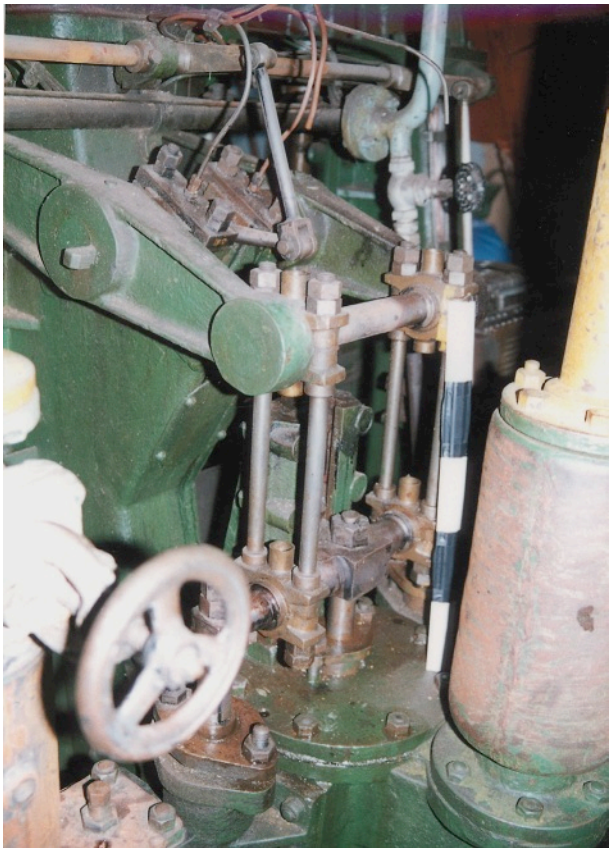
After cleaning, the engine was turned over by barring, though it is not recommended to do this too often until the rest of the engine and cylinders have been dismantled and cleaned, and the lubricators checked. Although quite hard to turn over, this is to be expected as the cylinder walls will not be in a very clean condition.



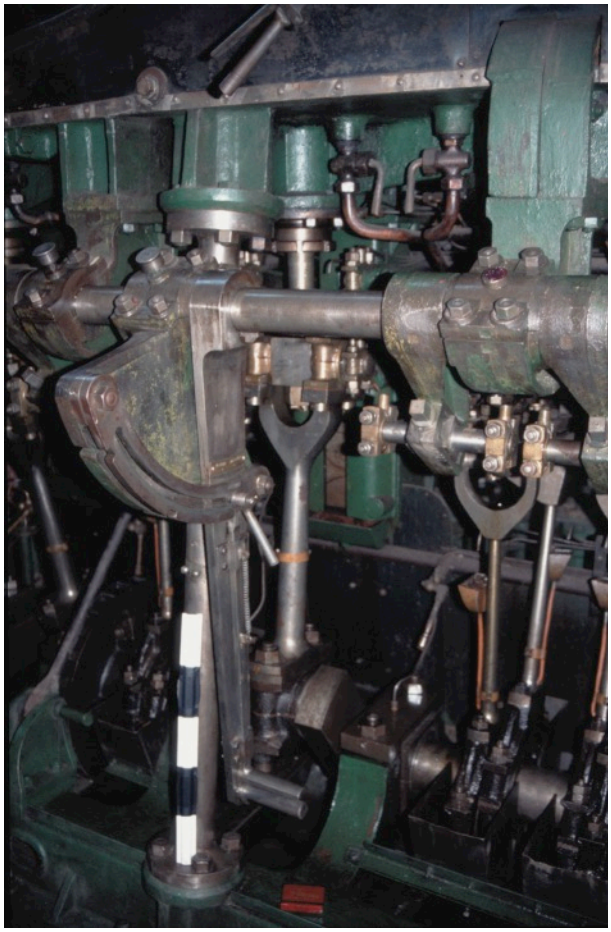


Above: The high and intermediate lubricators on the left and the low pressure on the right.
Below: The high and intermediate cylinder reversing gear.





Above: The condenser pump.



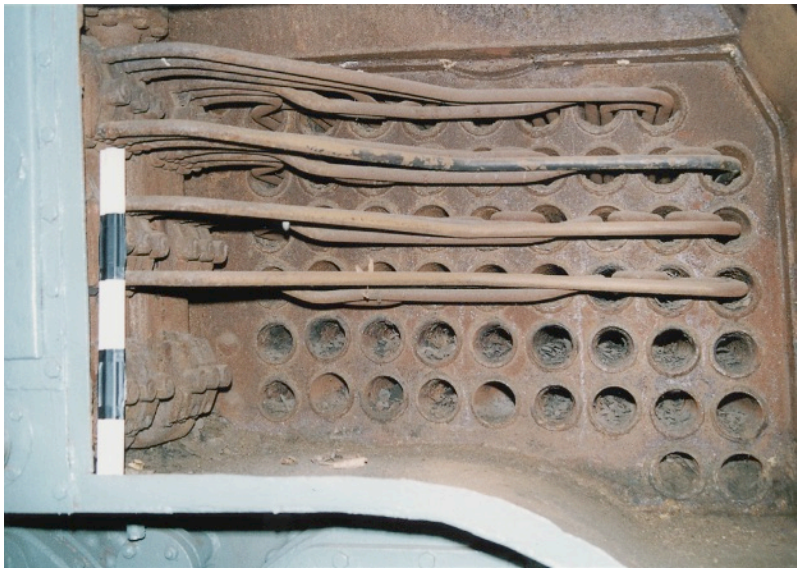
The reversing gear.

The condensing water controls.

Boiler

The tubes are in very poor condition and have been welded to the tube plate which suggests that this boiler is quite old. The tube plate itself is severely pitted. One of the super-heater tubes is holed. Much corrosion will have been caused by rain and snow coming down the funnel. This needs to be covered, perhaps at the point where it folds down.

If the engine is only going to be turned over for demonstration, the original boiler could be retained just as an exhibit. The boilers used on these tugs are well documented, extensive drawings being available. The boiler could be cut just behind the dome such that the firebox and boiler front is retained. The operation of the original boiler could then be described for visitors. The remaining section of the boiler room, comprising around 4 metres in length, could be used for the installation of a small package boiler or compressor which could be used for turning the engine. This would probably leave enough space to create a small storage area.



Above right: access to the rear of the boiler. Any new boiler would have to fit through this access.

Above left: The starboard side of the boiler which has wider access than on the port side.

Left: The superheater tubes, tube plate and tubes.

Conclusions

1. The condition of the engine appears, from the brief inspection, to be suitable for operation for display. However, a thorough cleaning of all moving parts needs to be completed. The method of operation also needs to be considered. There are three possible solutions:
   a. Using a small package boiler and operating with steam. The problems here are the cost of installation and the need for the operator to have a reasonable understanding of how a steam engine works. The engine would need to be warmed before operation to reduce wear, and this would require someone to be in attendance some time prior to operation. The boiler would require regular inspection and insurance.
   b. Using compressed air. There are problems with operating steam machinery on compressed air for long periods as the expansion of the air results in cooling. This can result in ice forming within the cylinders and the engine seizing up. Lubrication also needs to be considered. Depending on the type of air compressor, a receiver may be needed and this would require regular inspection and insurance.
   c. An electric motor drive. There are several difficulties with this, the most serious being the location of the electric motor. As the engine has no flywheel - the propellor and shaft acting in this capacity - there is no obvious place to locate the electric drive. If fitted at the end of the crank shaft, it will intrude into the boiler room. It could be possible to devise a drive to be fitted to the coupling by the thrust bearing, but this would require some modification of the original shafting. Also, the power required for the size of motor needed to turn the engine over is probably well over the capacity of the electricity connection to Nadbór, so a new, larger, cable would have to be fitted.
2. The general condition of the engine is good, and repainting is not suggested.The main bearing areas should be carefully dismantled to ensure they are clean, particularly removal of the cylinder covers to allow the cleaning and lubricating of the cylinder walls. If possible, it is always best to retain as much of the 'as operated' condition as possible as this can make interpretation easier and more relevant to the visitor. However, the engine and boiler room walls should be painted to ensure that visitors do not get their clothes dirty.

   Care should be taken in cleaning brass-work as too thorough polishing can damage the fittings. Use the finest grade of emery cloth only if necessary to remove scratches or dents, otherwise use 'wet and dry' paper or just a corrosion remover. Subsequently use a simple polish with minimum abrasive properties.

3. A plan should be drawn up for the boiler room. The rear section of the boiler could be removed, though the bottom of the boiler shell should be retained as this forms the base on which the surviving part of the boiler will sit. It will be important to ensure that the remaining part of the boiler is secure and will not move or tip over. The area behind the boiler could be used for storage as such space is severely limited on the ship.

M. Clarke
December 2000