(Text or picture too small for your eyes? - **Push "Ctrl", and scroll with "scroll wheel" of mouse**)

Ship's with DOXFORD ENGINES, build by AUSTRALIAN GOVERNEMENT ENGINE WORKS

(Manufatured by Commonwealth Government Engine Works, Port Melbourne)

	** "ON" (Official Number)	HULL build by	DOXFORD Type:	Engine no:	B.H.P.	YEAR of Manufacture	Ship's Name ID no	OWNER	Broken up Lost
1	177239	Mort's Dock Sydney	56LB4	21	3000 BHP (2238KW)	1953	Boonaroo 5048215 '70 Collin Four '76 Reunion	Aust. Ship. Board	Chittagong 17.11.85 Stranded whilst waiting BU 24.5.85
2	177246	Evans Deakin & Co Brisbane	56LB4	22	3000 BHP (2238KW)	1954	Bulwara 5055191 '70 Collin Five	Aust. Ship. Board	Wrecked 25.01N/121.53E 22.10.71 (Keelung-NZ bagged urea)
3	177249	Evans Deakin & Co Brisbane	56LB4	23	3000 BHP (2238KW)	1954	Inyula 5162243 '75 Eurometal '76 Lorna I	Aust. Ship. Board	Missing Foundered off Kilyos ~ 11.12.77 21 Lives lost Durres-Sulina, iron nickel ore
4	196741	Mort's Dock Sydney	56LB4	24	3000 BHP (2238KW)	1956	Baralga 5036169 '72 Hangchow '77 Taiping '79 Sea Horse '80 Ever Luck	Aust. Ship. Board	BU Kaochsiung 1.4.80
5	191872 6496	NSW Govt. DY Dyke End (State Dockyard Newcastle)	56LB4	25	3000 BHP (2238KW)	1957	Iranda 5162671 '77 Jollyboat SA GRC Piraeus	Aust. Nat. Line ANL	Wrecked 34.51.30N/45.44E 3.3.81 (Ashdod- Port Marghera, potash) BU Laurium 23.6.82

6	191873	NSW Govt. DY Dyke End (State Dockyard Newcastle)	56LB4	26	3000 BHP (2238KW)	1957	Illowra 5159014 '70 Thanasis M. '79 Unity	Aust. Nat. Line 	BU Eleusis 1.9.83 (Ploioscrap Ltd)
7	196746	Evans Deakin & Co Brisbane	60LB4	29	3600 BHP (2686KW)	1956	Lake Barinne 5202483 '72 Regional Enterprise '81 Lacondon	Aust. Nat. Line 	BU Brownsville 2.4.82 (Consolidated Andy Inc.) Work began 16.6.82
8	196374	Evans Deakin & Co Brisbane	60LB4	30	3600 BHP (2686KW)	1957	Lake Boga 5202495 '78 Lake '79 Gungnir IV '80 Socar Uno	Aust. Nat. Line 	BU La Spezia 11.84 (CN di Santa Maria)
9	196376	Evans Deakin & Co Brisbane	60LBD4	31	3600 BHP (2686KW)	1958	Lake Colac 5202512 '78 Kimolos	Aust. Nat. Line 	BU Inchon 11.9.79 (Ssang Yong Corp.)
10	315297	Broken Hill Pty Co Whyalla	60LBD4	32	3600 BHP (2686KW)	1958	Lake Macquarie 5202586 '79 Al Taslim	Aust. Nat. Line 	BU Chittagong 5.10.82 (Khalil & Sons)
11	199431	Evans Deakin & Co Brisbane	60LBD4	33	3600 BHP (2686KW)	1959	Lake Sorell 5202627 '79 Al Toos	Aust. Nat. Line 	BU Chittagong, beached 24.6.81 (Bengal Shipbrokers)

12	315393	Broken Hill Pty Co Whyalla	67LBD4 T.v.i.	34	4600 BHP (3432KW)	1960	Mount Keira 5242936 '76 Afstralos	Aust. Nat. Line 	BU China 12.83
13	315398	Broken Hill Pty Co Whyalla	67LBD4 T.v.i.	35	4600 BHP (3432KW)	1960	Mount Kembla 5242938 (1974 Lg 167 Om oa,10372 gt, cv to drilling ship) '73 Regional Endavour '87 Endavour	Aust. Nat. Line 	BU Chittagong 28.8.87 (First Copper & Iron Industrial Co)
14	315390	Evans Deakin & Co Brisbane	56LBD4 T.v.i.	36	3600 BHP (2686KW)	1959	Mundoora 5243671 '77 Marina	Adelaide SS Co 	Foundered 14.35N/59.01E 9.9.84 (Aqaba-Calcutta, phosphates)
15	315409	Broken Hill Pty Co Whyalla	67LBD5 T.v.i.	37	5700 BHP (4252KW)	1962	Wollongong 5392549 '74 Myarra '80 Iron Myarra '82 Myarra '83 Yarra	Bulkships Ltd	BU China 20.10.83
16	315417	Broken Hill Pty Co Whyalla	67LBD5 T.v.i.	38	5700 BHP (4252KW)	1962	Mittagong 5412636 '77 Iron Mittagong '82 Shalini	Bulkships Ltd	BU Gadani Beach 11.12.82 (Faroog S. Mohammadi)

(L.S. : This list was for a great deal accomplished with the permission from GLEN STUART, from his book "My Time at Engine Works"; and also as a member from the "MIRAMAR SHIP INDEX")

Abbreviations:

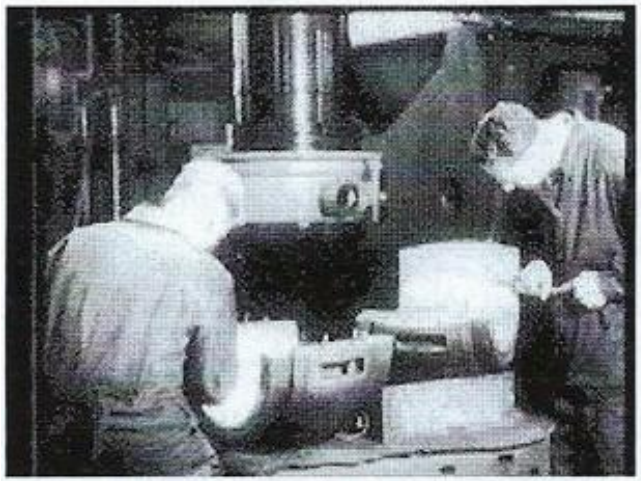
Before IMO numbers, each country had its own shipping register and each ship had its **o**wn **n**umber in that register.

** **In Britain they called that number the "Official Number," (O.N).** This was changed to the register of any country that the ship was subsequently sold to.Sometimes there was more than one ship that had the same name, so the **ON is another means of identification.**

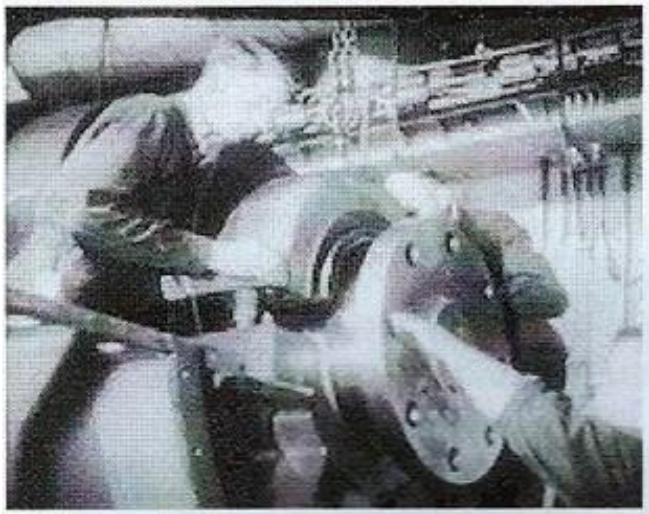
The management of each "Empire" ship was given to a shipping company as soon as it was built and sometimes the shipping companies bought the ships after the war

IDNo: from Miramar Ship Index http://www.miramarshipindex.org.nz/ship/list

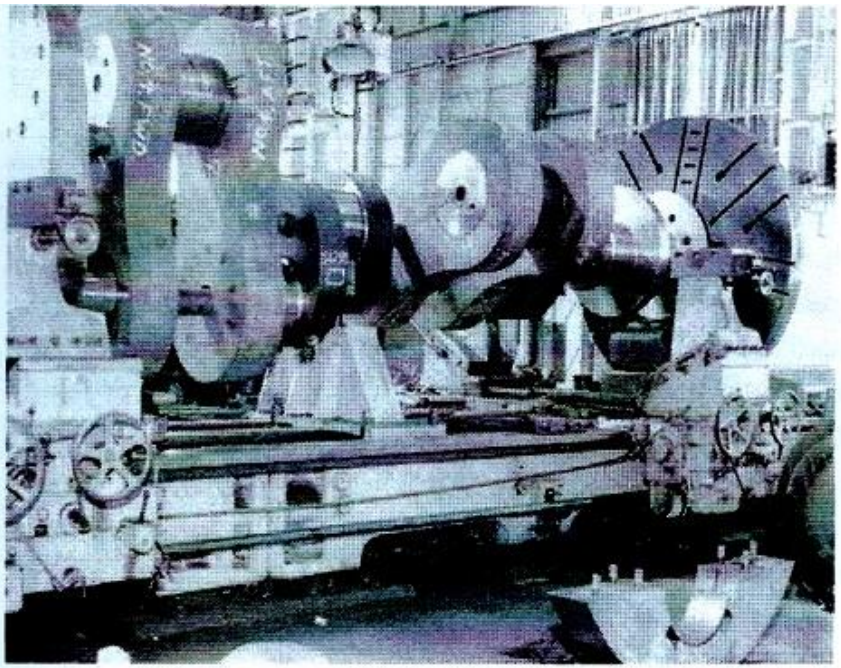
Design: A.Verheijden, Stekene, Belgiumhttp://users.telenet.be/doxford-matters



This shot shows Lloyd Jones, a fitter tradesman on the right with apprentice John Churchill on the left, hand scraping the two sections of a main lower end connecting rod bearing.
Note the spherical section of the outer surface of the bearing designed for self-aligning. Standing in the back-ground is a cylinder liner with its water jacket shown. The centre flange is for the air-start valve whilst that to its left is the fuel injector. The notorious relief valve is out of sight.
(Doxford 16mm film photograph).

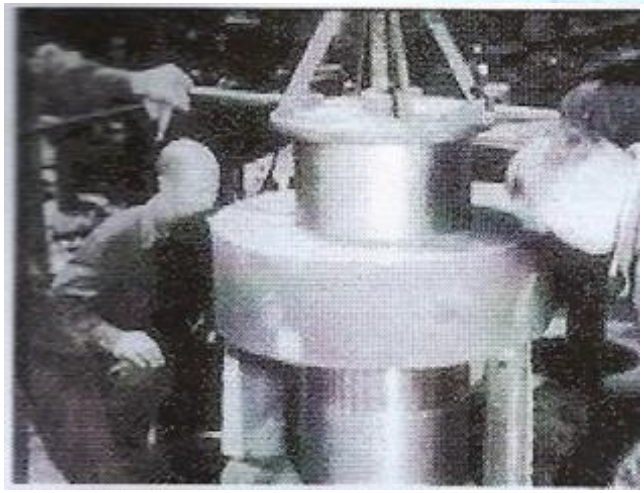


The fitting of one of the main bedplate bearings is shown here. My brother Raeburn who commenced his time in 1948 is shown helping fitter Bert Woods with the aid of the overhead crane and Joe Costello, the rigger, who is signalling the crane driver approximately 60 feet above, to aligning the keep before bolting home. Lead wires are placed between the keep and the shaft, flange of which is shown, bolted down, removed and measured with a micrometer to obtain correct clearance. If this is incorrect shims are removed or added to obtain the required clearance. This means that it may be necessary to remove the keep several times to obtain the necessary adjustment.



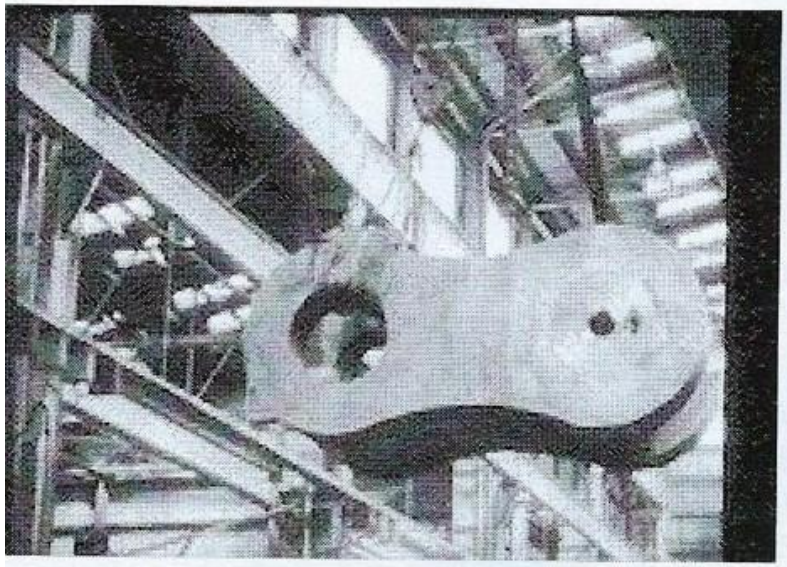
This photo shows a two-cylinder section. The crank journals can clearly be seen, one on the left in the vertical position and the other central at almost 90 degrees. This is the aft section of the crankshaft as the right tool-box is set at the trust block flange which takes the trust of the propeller. Without this flange the propeller would virtually drive the shaft clean out though the front of the engine.

The joint flange for the second half is shown on the left. With the centre air scavenger arrangement in an engine (and such was the case in the first six), the eccentric journal is fitted here between the halves. The main centre journal is shown here in the lathe steady, to prevent sag and for rigidly.

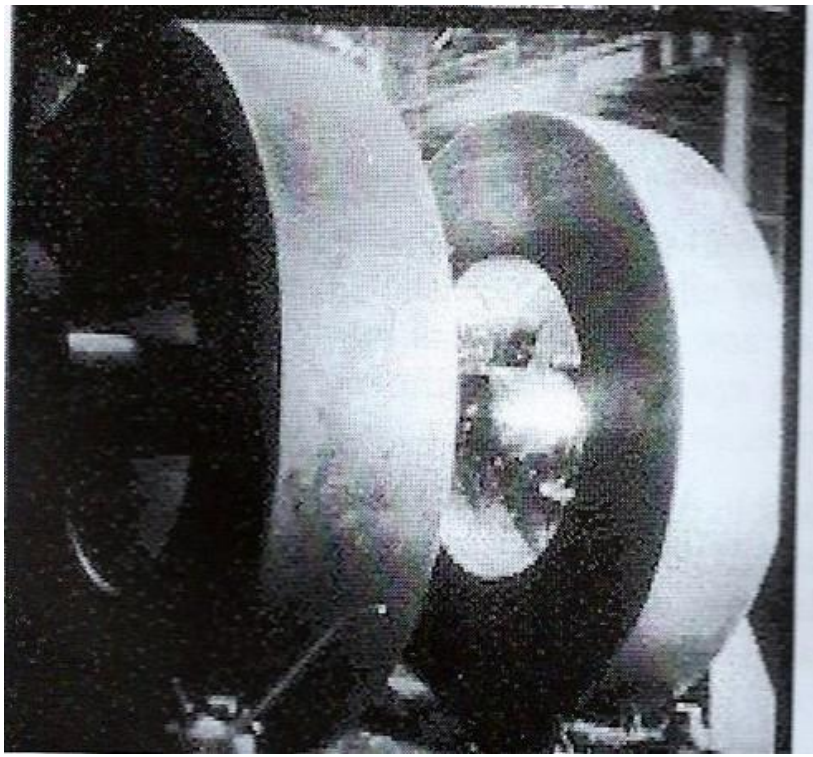


SHRINKING

Two Webs having had there profile finished by machining and are set in line, the bores are heated by gas
Here the journal has already passed through the first web and enters the lower web
The flange on top assures the correct location of the pin
This is the first of ten shrinks for a two cylinder section of a crankshaft and for every additional cylinder an extra four shrinks are required

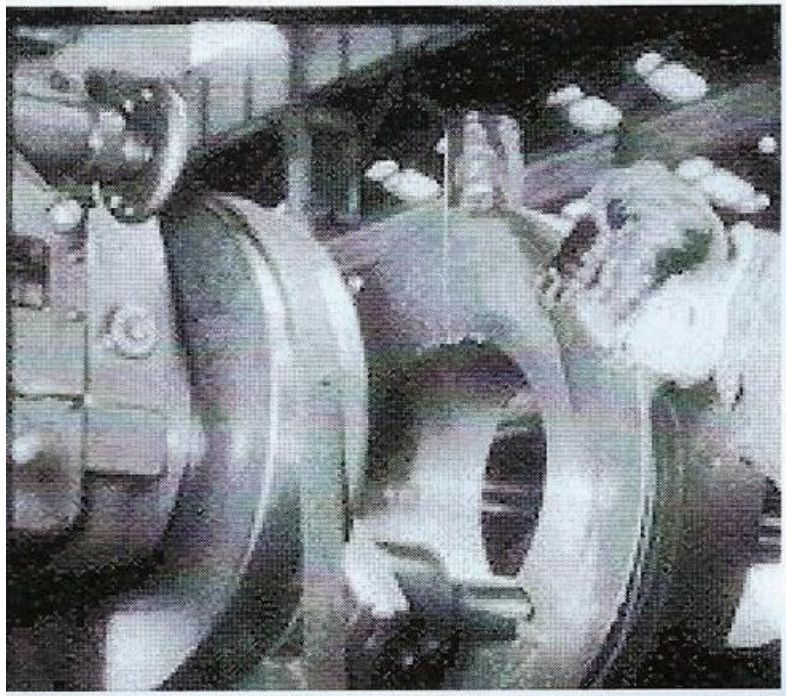


At left is a web assembly complete with journal pin. The smaller hole to the right in the pin is for oil lubrication of the white metal connecting bearing. This assembly is being moved up shop to the horizontal borer for final machining of the bores on the left.



In this second picture the two bores are being machined in line, and in the lower picture the operator, Alan Fieldon, has completed the boring operation and is truing up slight warping in the face which was caused by the heating during shrinking. This is necessary for alignment of further shrinking operations.

It can be realised by the size of all these larger components that the use of an overhead crane plays a major role in the movement of components from one area to another.

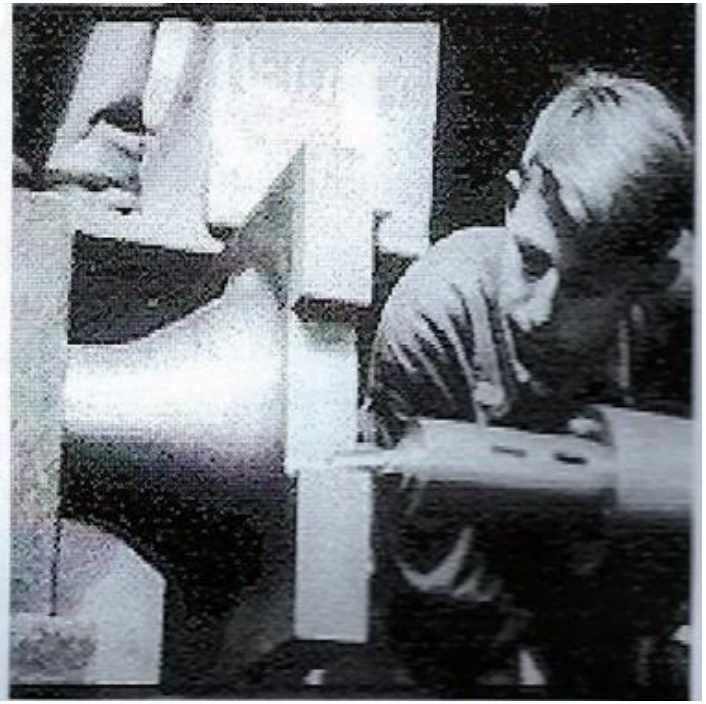


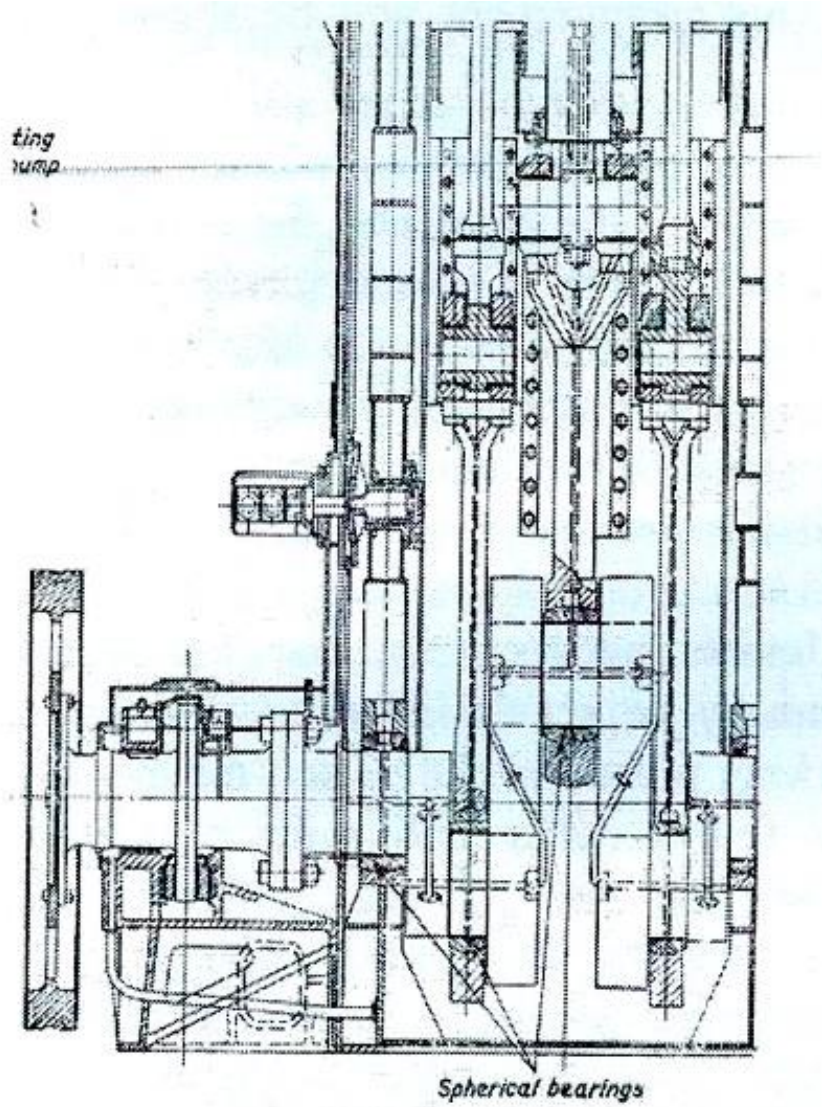
In this photo the two crane rails can clearly be seen, the upper for the larger cranes needing more high for clearance and the lower for the smaller 10ton crane, which could not be used over the fitter's end because of the height of the assembled engines.

The photo here shows Len Berghoff on the Craven lathe turning the air grooves in a scavenger valve disk. These are made of aluminium, and after he has finished the turning operation they will be cut into segments. This is a delicate process, for one time he had a 'dig' in with the tool and the whole assemble shattered to pieces. Fortunately Len did not suffer any ill effects as the pieces fell into the bed of the machine. The work is mounted on the machine's seven foot-face plate.

Source: "My time at Engine Works" by Glen Stuart

Another operator (and he was then only a seventeen year old first year apprentice) was yours truly and the writer of this story. Here I was working the horizontal drilling and milling machine, milling out the clearances in the palm sections of aside con-rod. The rod is set up on two parallel blocks with vee blocks on top of each. This is necessary because the work table is at floor level and designed to accomodate the likes of the bedplate when the machining of the joint faces of the crankshafts. The table is approximately 25 ft x 40 ft long.





Now to the bearing numbers of the engine we spoke of earlier. As shown in the drawing on the left, starting at the bottom we have the two main crankshaft bearings, the centre connecting bearing for the lower piston and two side connecting bearings for the upper piston. These bearings are all spherical for self-aligning purposes. At the top end of each rod are two bearings which absorb the reciprocal motion of the crankshaft, transferred to a crosshead slipper located in the cast iron guide. All these bearings are whitemetaled and after machining have to be scraped in. So we have eleven bearings at the lower end of the engine per cylinder; multiply that by the number of cylinders (in this case four) will equal forty-four plus the centre air scavenger, another three bearings. On the top guide (not shown here) we have a crosshead beam with straight bored pins.

Needless to say there are countless other bearings that go to make up an engine, but these listed are only the main and largest.