M.I.A. – Shanghai - 2002

Metalock Engineering UK

www.metalock.co.uk

The Industries we serve

- Marine
- Steel and Aluminium
- Mineral Processing and Cement
- Power Generation
- Offshore
- Pressing and Forging
- Pulp and Paper
- Petro Chemical
- Bridges / Heritage
- Railways
- General Engineering

THE MARINE INDUSTRY

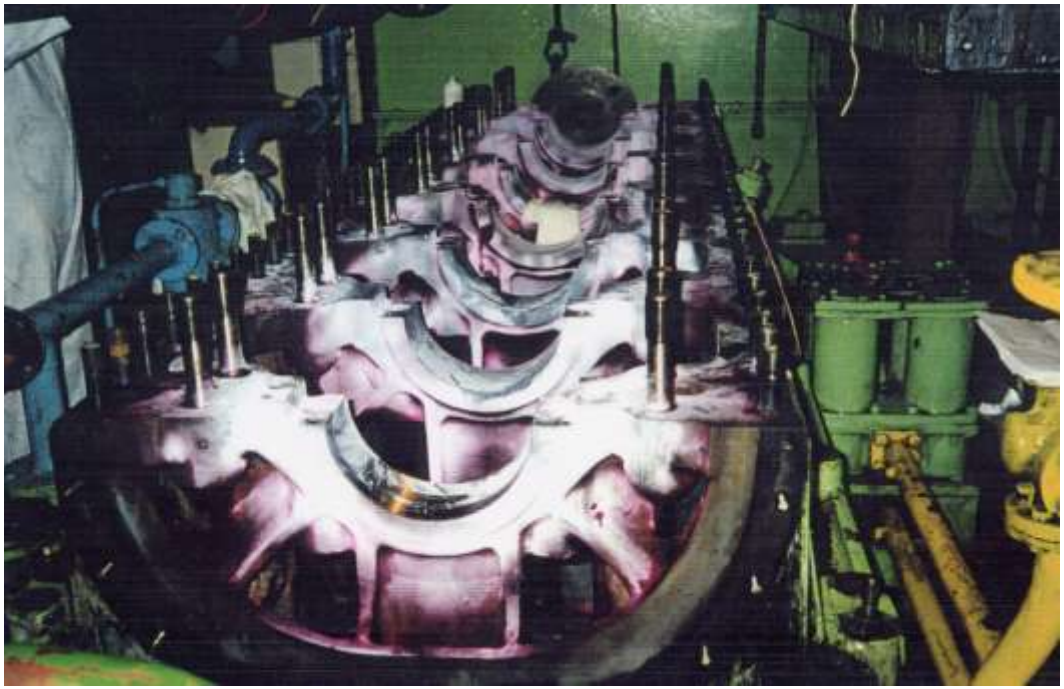
Ship owners James Fishers contacted Metalock Engineering UK to see if a repair was possible on their main engine bedplate.

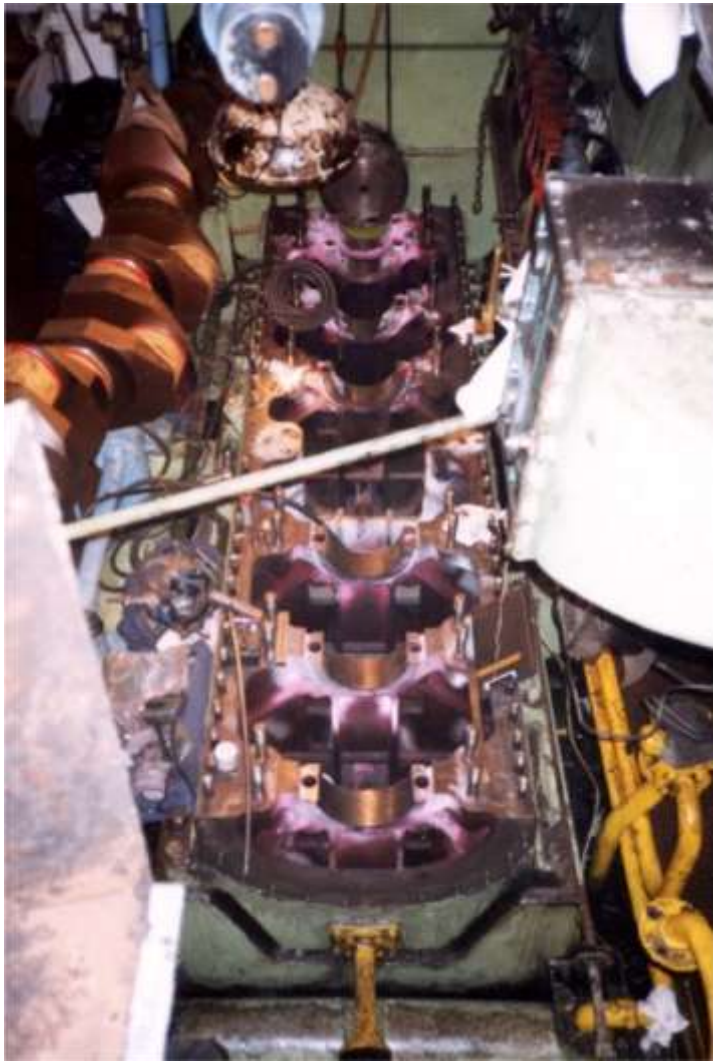
After a routine inspection cracks were found to both sides of the No.4 main bearing pocket, these were thought to have been caused by fretting of the bearing cap due to insufficient tightening of the bearing cap nuts.

The owners had consulted with the engine manufacturers, who stated a new bedplate would take 6 months to deliver.

If a repair could not be carried out the owners would be in some difficulty.

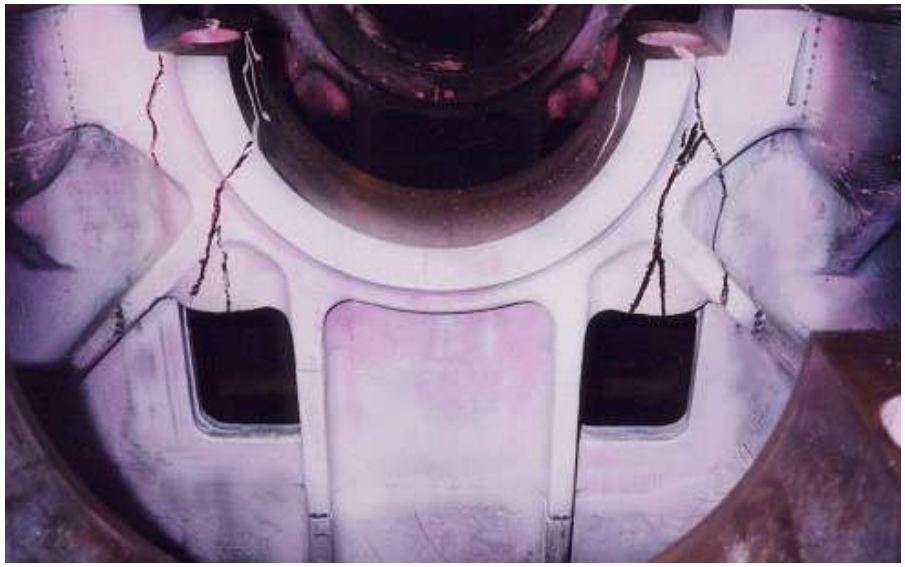

ABERTHAW FISHER





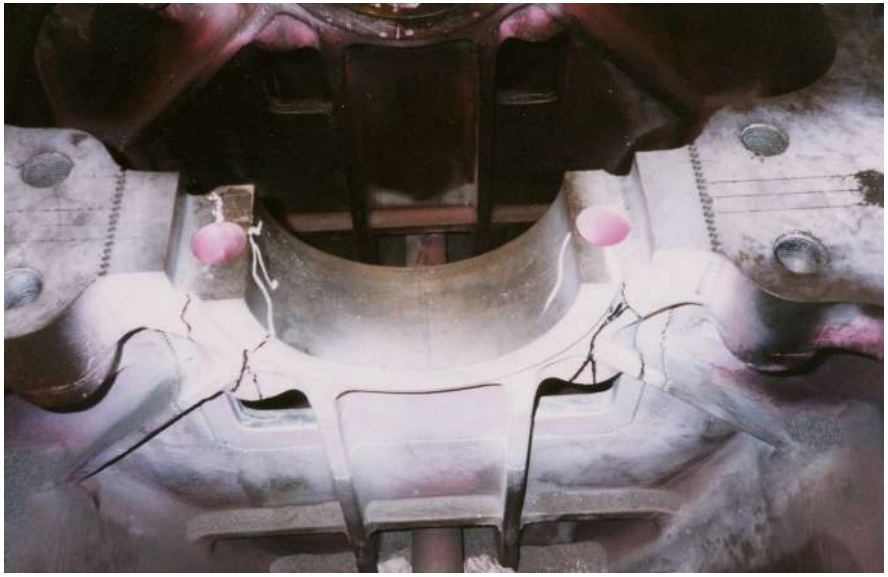
Overall views of the main engine bedplate

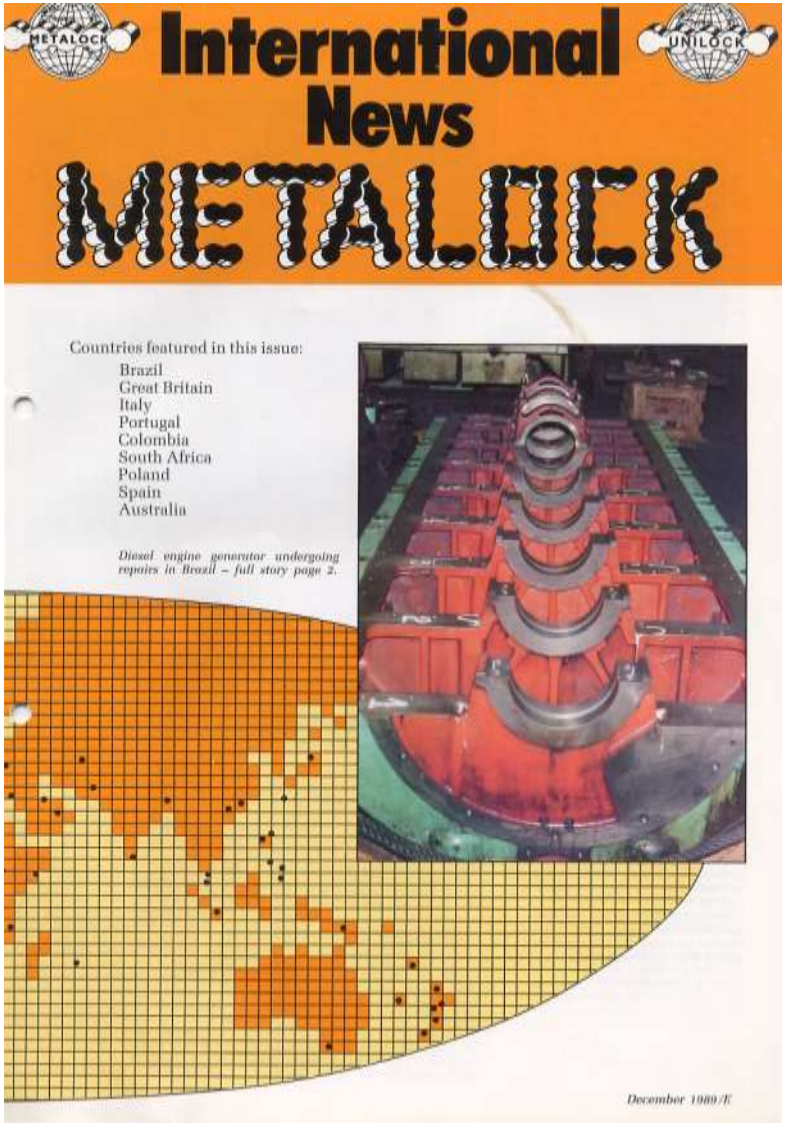
Engine type: WH Allen – type6 BCS 37 Delta

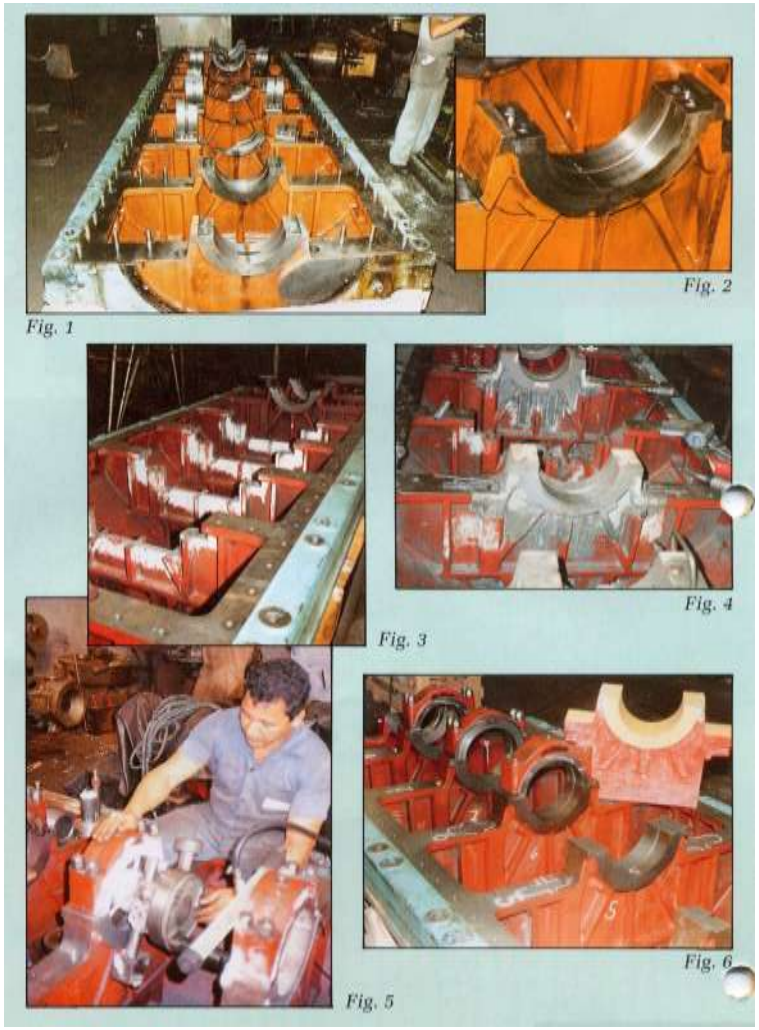


Bearing pockets highlighting cracks

Area of cracking to thin to repair, suggest bearing transplant



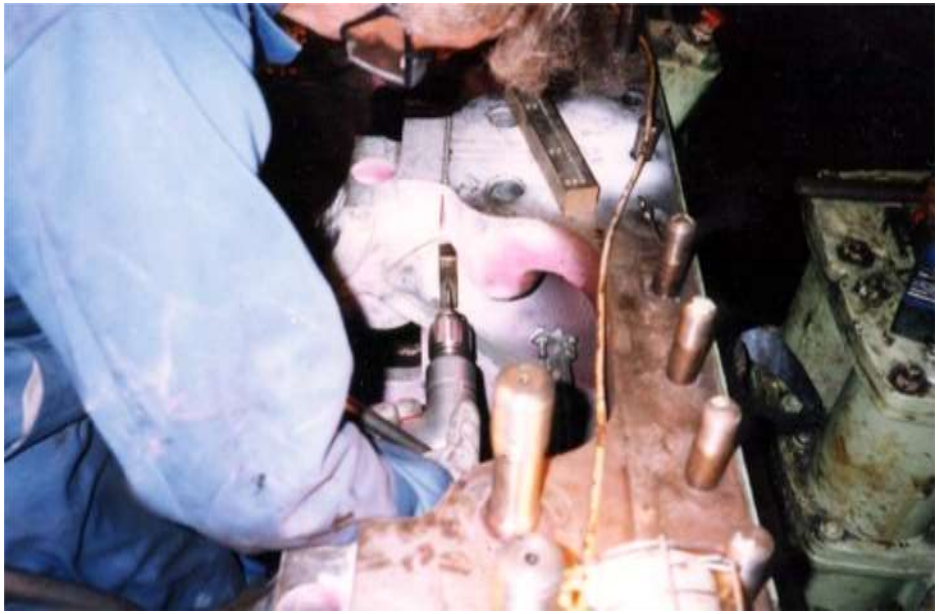




A photograph of a similar repair convinces shipping company to accept Metalocks proposal

A repair was designed with the customers approval and the technicians were dispatched to site

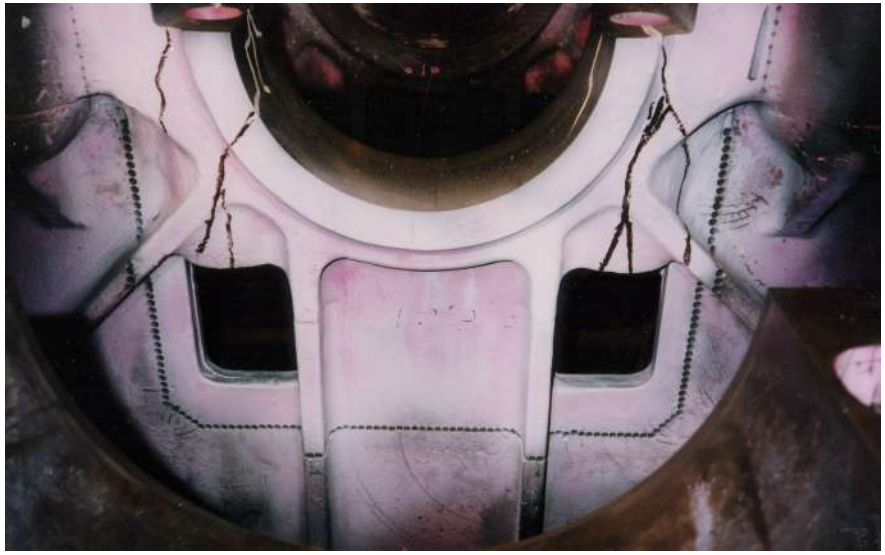
Technician marks out area for removal



Chain drilling using a series of Metalock jigs

The drilling was through the full depth of the parent casting

Vertical drilled holes locate side drilling

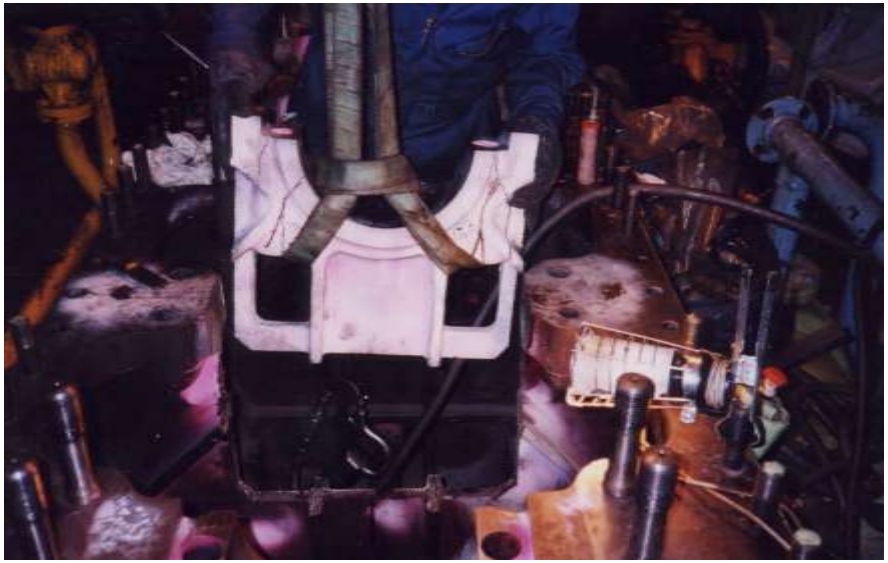


Holes drilled showing the full extent of area to be removed

Sizing the holes ready for the removal of the bearing pocket

Driving a wedge into the sized holes to break the seal

Removing the bearing pocket in one piece to be used for dimensional purposes



Aperture of bearing pocket ready to be cleaned up

Drilling between the Bearing Cap joint face to take fixed Masterlocks

All sharp edges removed to eliminate stress raisers

Non-destructive testing carried out to ensure all cracks have been removed

All faces hand dressed to accurate dimensions

<u>Tools used</u>

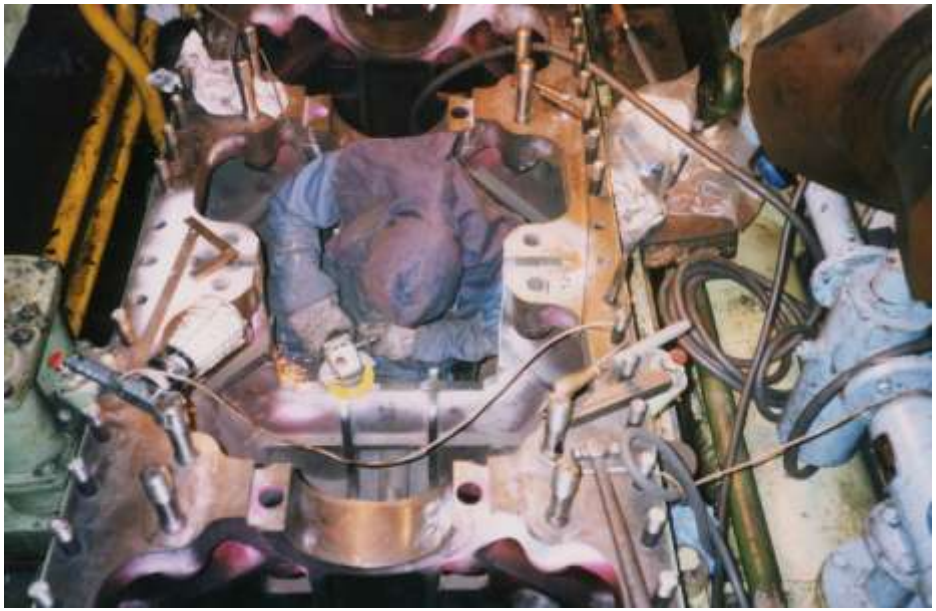
Hand Grinders

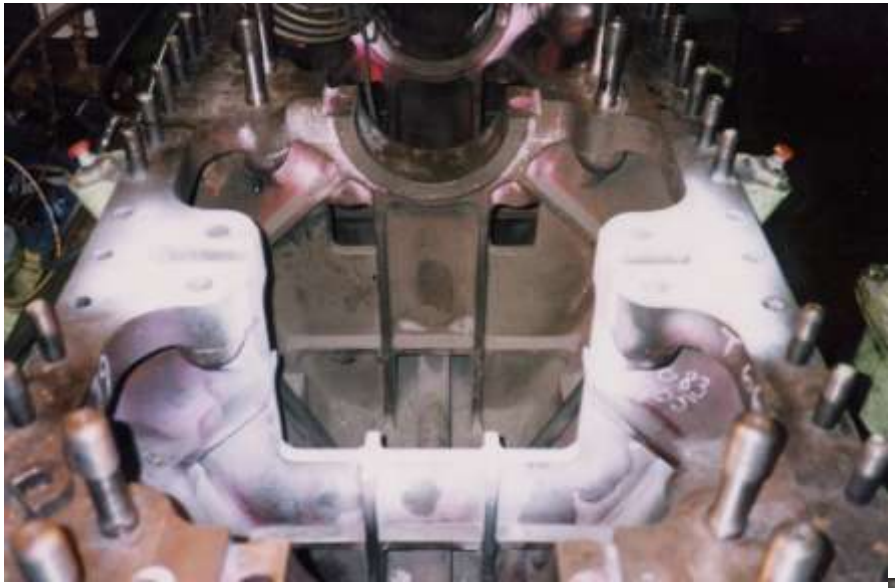
Files

Tape Measures

Set Square

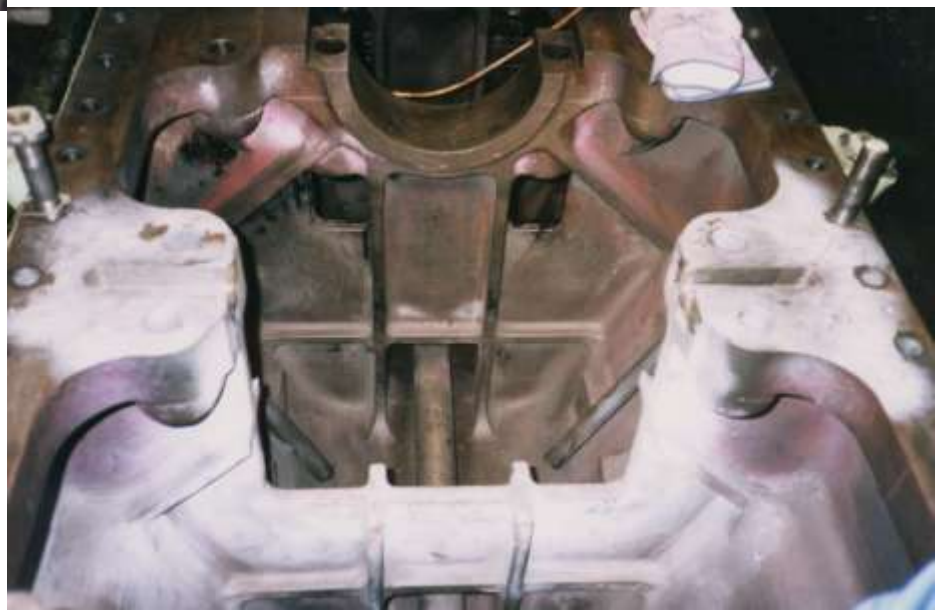
Inside Micrometer

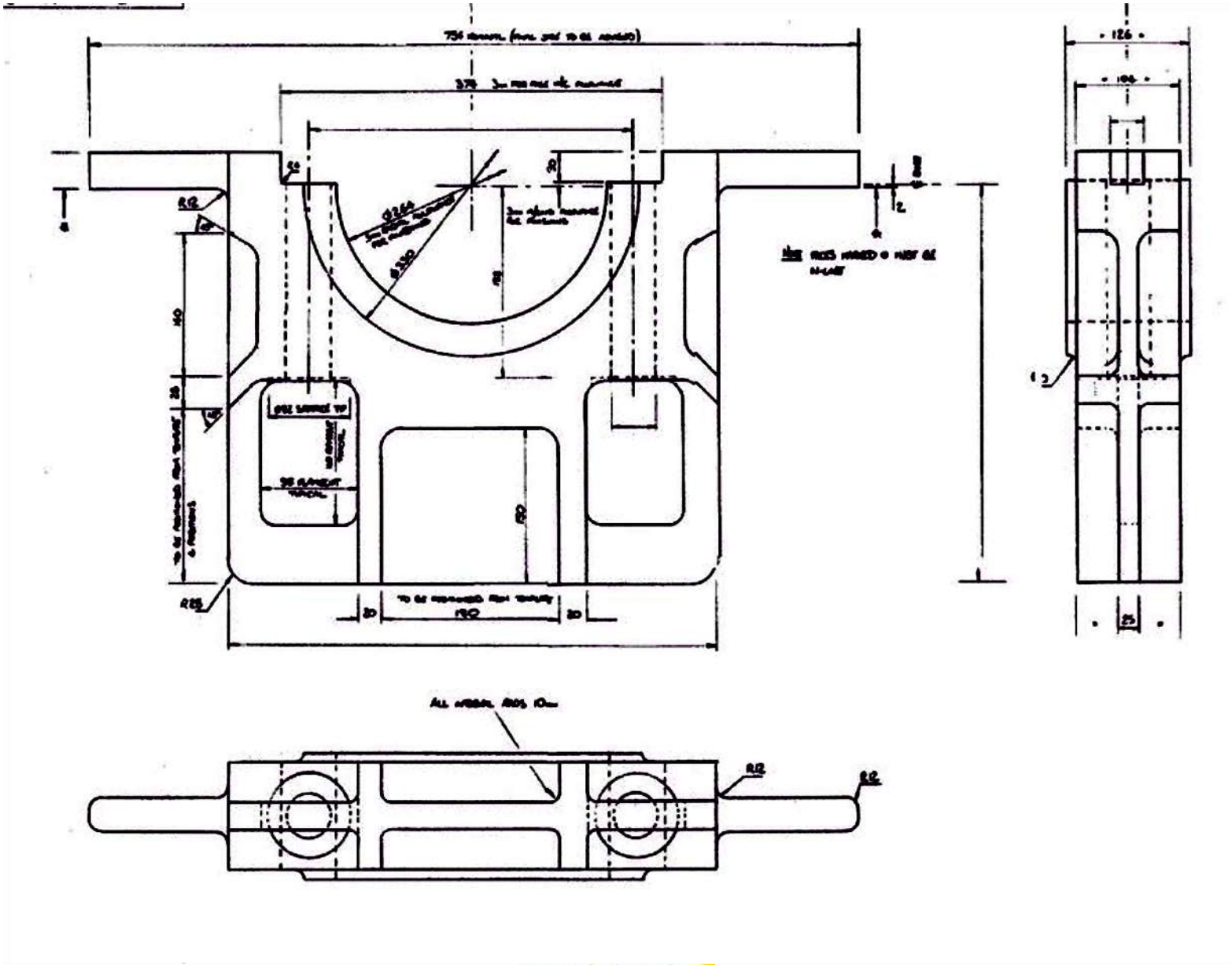




Completion of hand dressing

Dimensions taken and transferred to a drawing



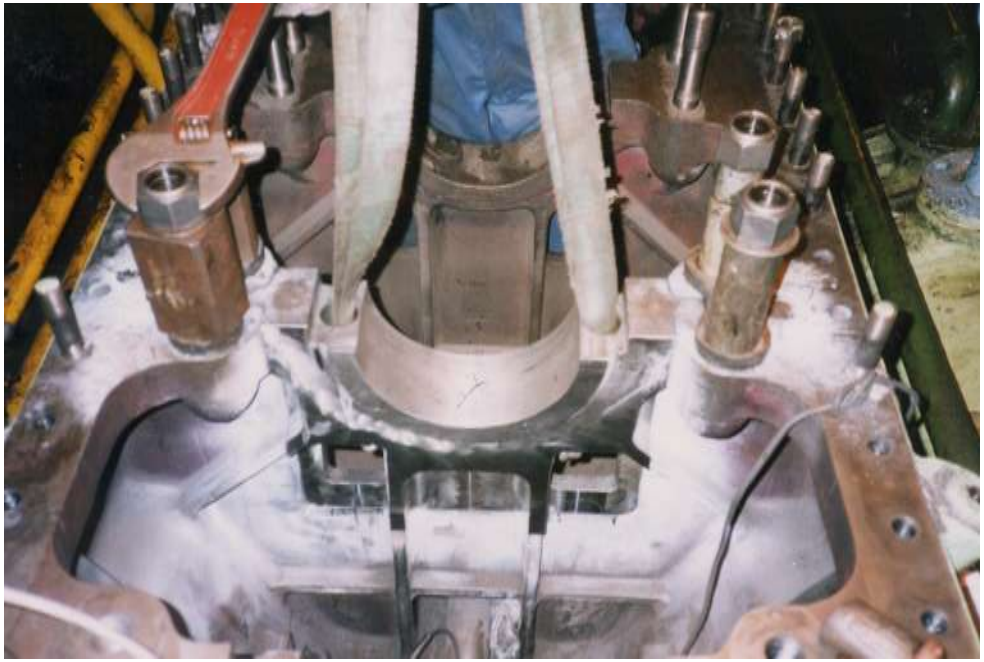


Steel insert manufactured from a solid ingot

Insert showing attached Masterlocks to help spread the load

Bearing Cap bolt holes drilled at manufacturing stage

Insert being lowered into the prepared aperture making sure all the ribs are inline



PLASTIGAUGE

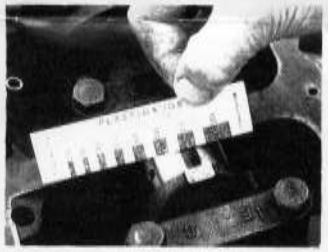
PLASTIC PRECISION CLEARANCE GAUGES

PLASTIGAUGE provides a simple but effective method for the measurement of clearance between fitted surfaces. It is particularly useful for measuring clearances in split bearings or in situations where a feeler gauge cannot be inserted. Measurement of clearance in big-end bearings can be achieved without dismantling the crankshaft.

We recommend that the engine sump cover should be removed to expose the big-end and its retaining setscrews. Remove surplus oil and release the big-end shells by unscrewing the setscrews. Wipe the exposed surface of the journal and shell. Apply a smear of grease to the journal and squeeze a small quantity of silicone release agent on to the shell.

Trim a length of PLASTIGAUGE to fit across the journal using the grease to hold it in place. Replace the shell and tighten the retaining setscrews to the manufacturer's recommended torque setting without rotating the journal.

Now remove the shell once again by unscrewing the set screws to reveal the PLASTIGAUGE which will have been spread across the bearing surface as a stripe or band. Match the width of the PLASTIGAUGE stripe against the card gauge supplied and read off the bearing clearance.



It is adviseable to remove the PLASTIGAUGE stripe with a clean oily cloth, but users may be assured that any PLASTIGAUGE left behind is oil-soluble and cannot harm the engine in any way.

★

Ovality may be determined by placing PLASTIGAUGE around the bearing shaft.

General Information

The normal clearance in the big-end or main bearing should be approximately one part in 2,000 of the diameter. Thus a journal of 2" (50.8mm) diameter may be expected to show a clearance of 0.001" (0.025mm).

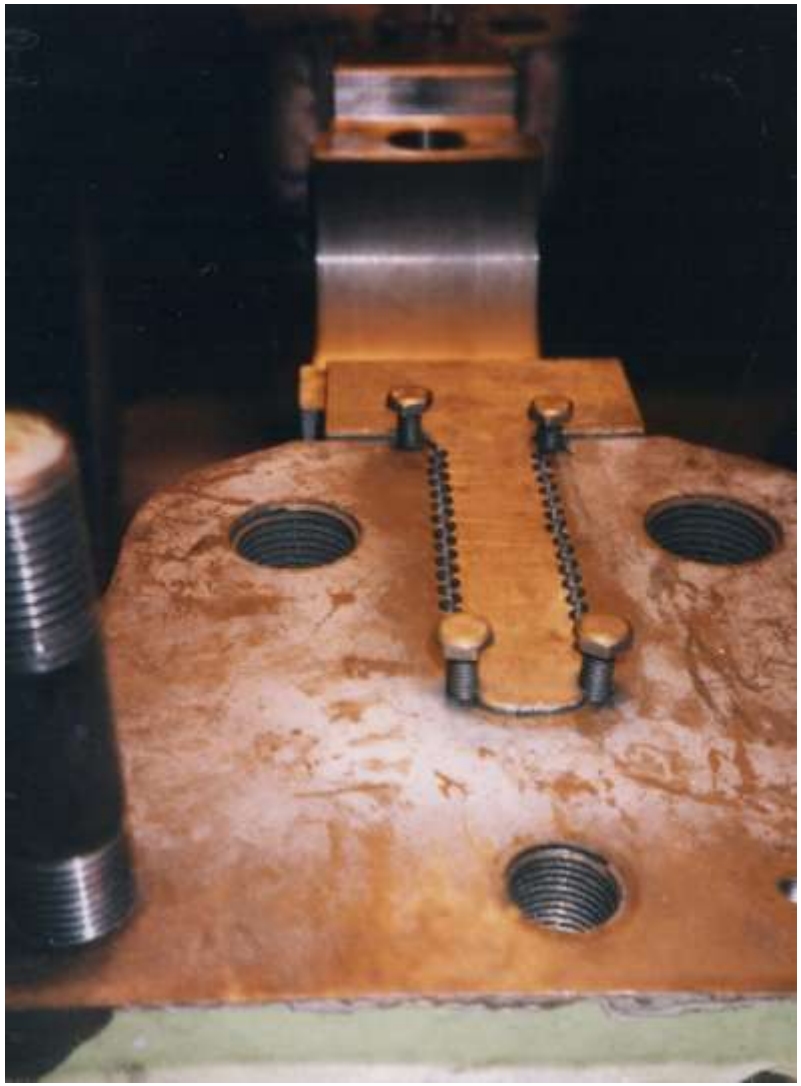
The oil escape from a pressure fed bearing increases by roughly the square of the clearance. Thus a clearance of 0.002" (0.050mm) can pass almost twice as much oil as with 0.0015" (0.038mm). If the pump capacity cannot meet this demand the pressure will fall and the bearing will be damaged. This illustrates the importance of accuracy in fitted bearings.

PLASTIGAUGE may be used to detect high spots in cylinder heads, pipe flanges, etc. It is useful in production, inspection and servicing.

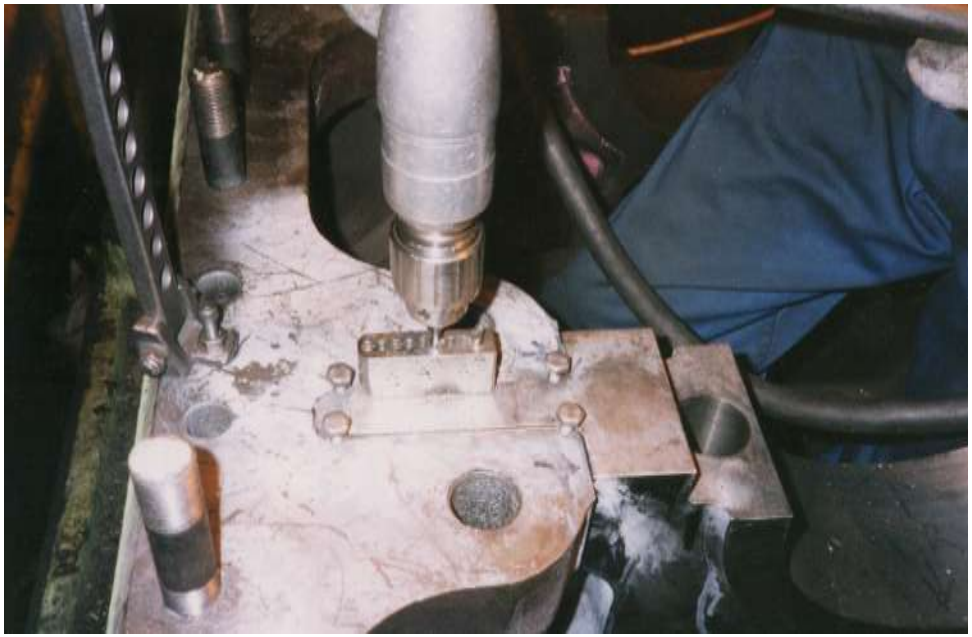
THE PLASTIGAUGE MANUFACTURING CO.
HEWARTS LANE, BOGNOR REGIS, SUSSEX.
Tel: STD. (0243) 263613 Fax: (0243) 262682

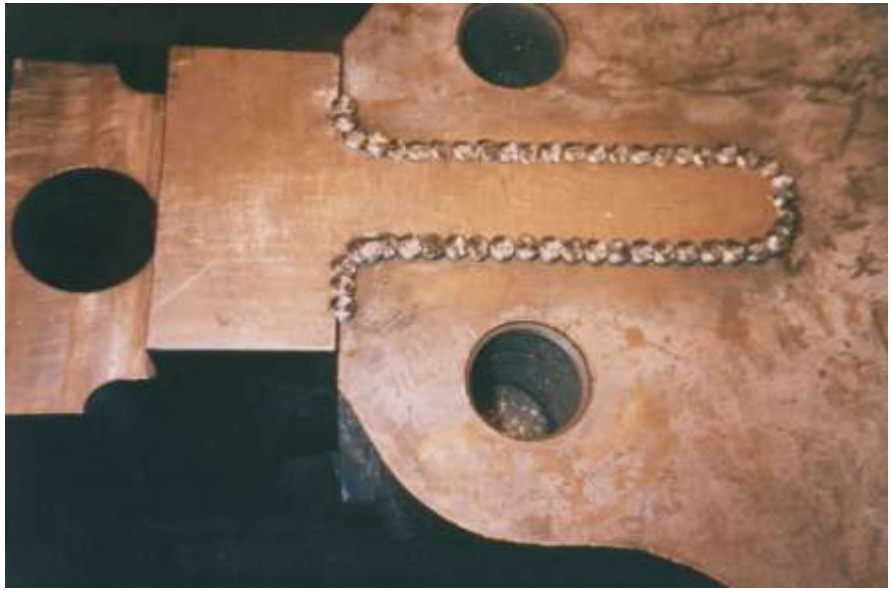
Suppliers of plastic precision clearance gauges to H.M. Naval Dockyards and to major engine companies throughout the U.K. and Commonwealth.

Attached Masterlocks are checked for correct seating using engineering blue



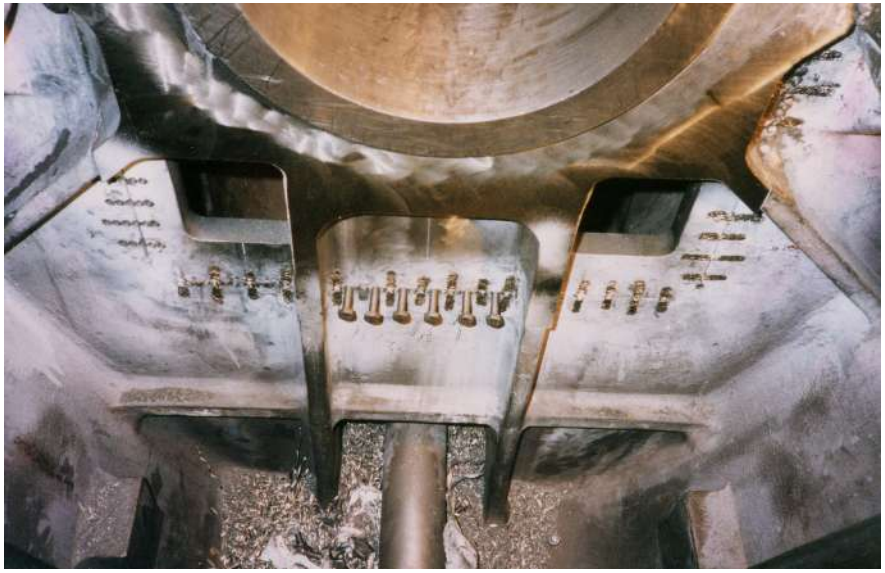
The process of securing the Insert begins with securing the Masterlocks





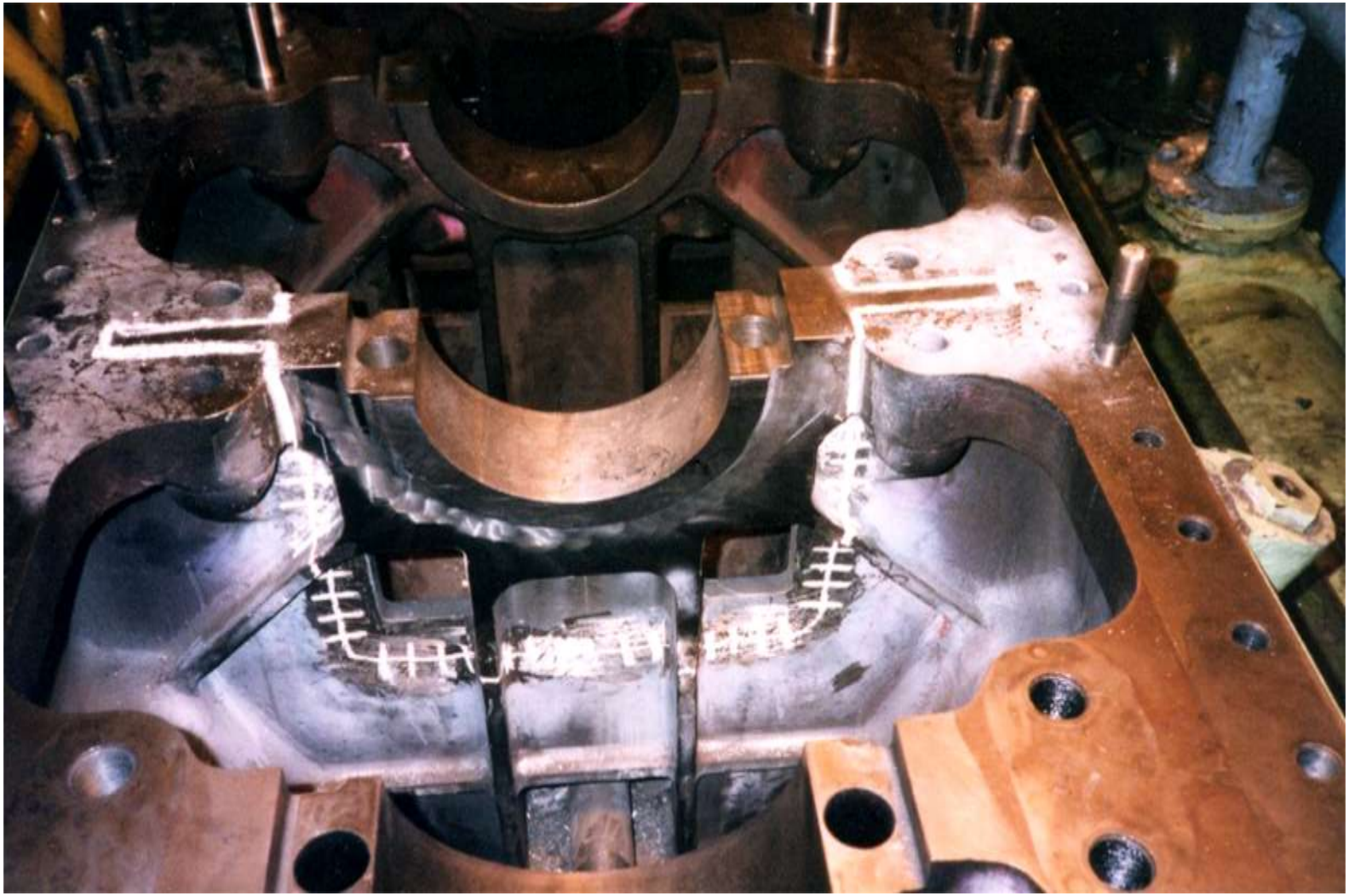
Line of Metaloy studs prior to peening

Apertures drilled off and filled with Metalock keys

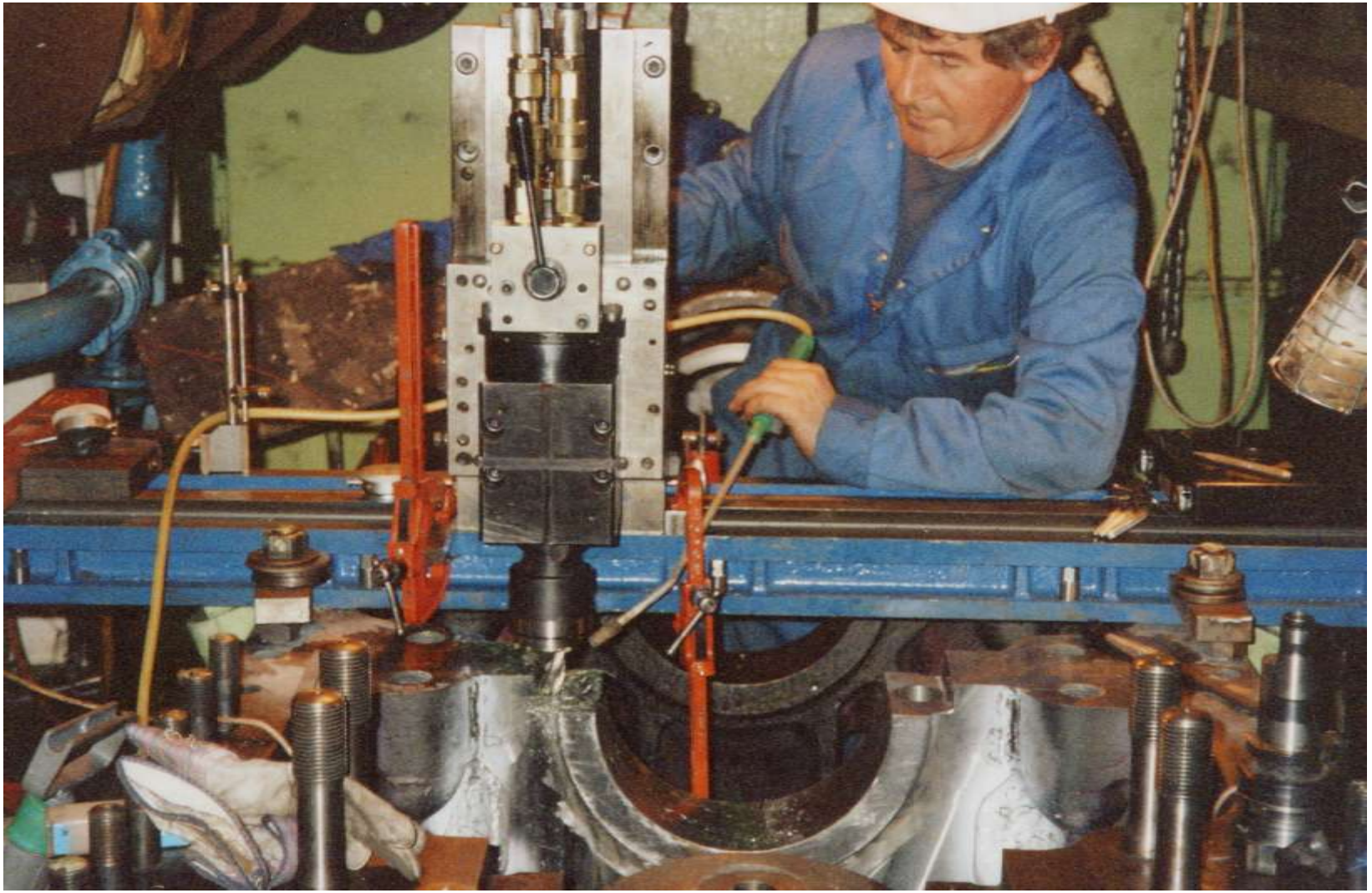


Metaloy studs being secured along the line of repair

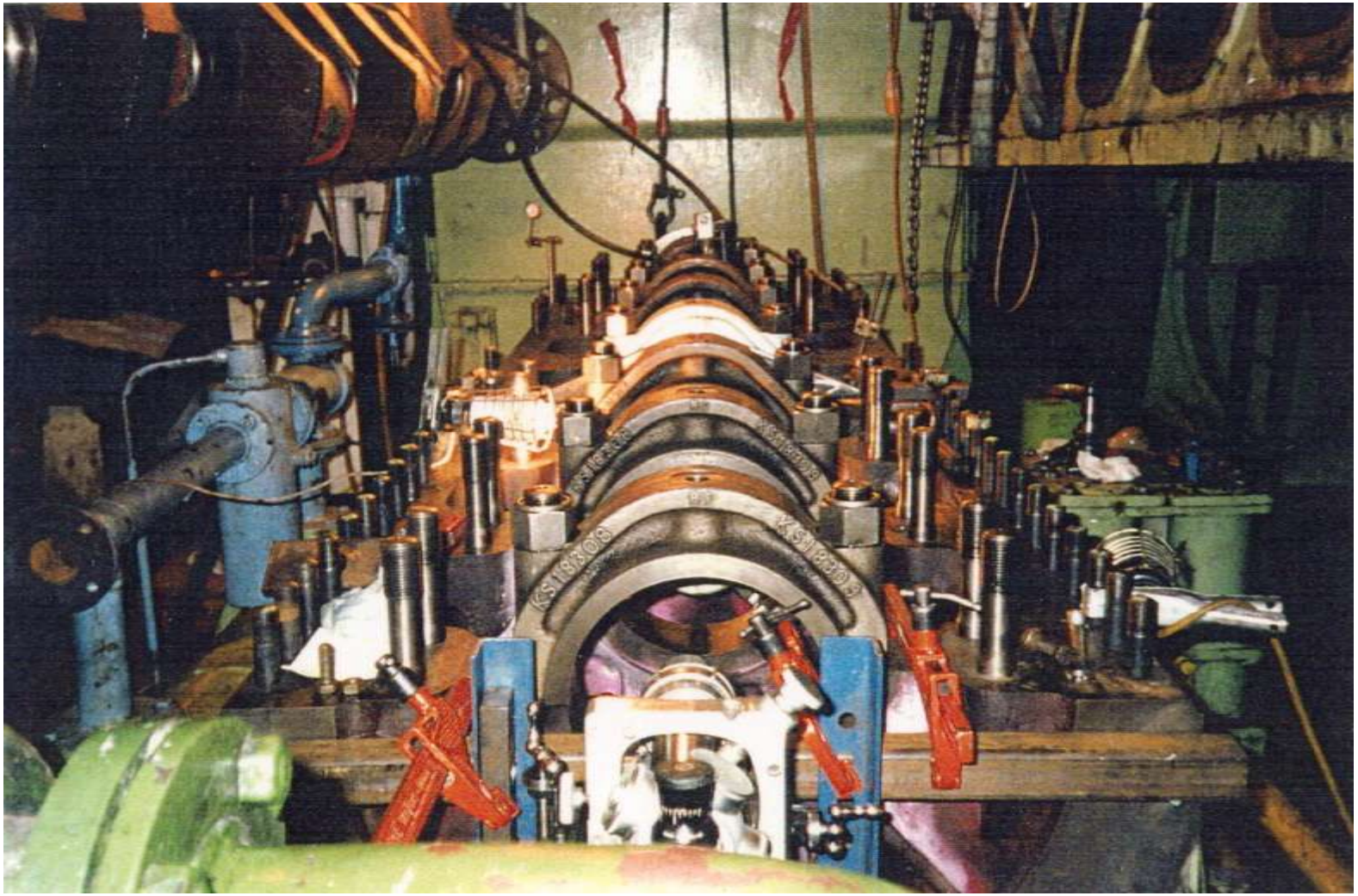
Repaired areas are hand dressed to complete the repair leaving the relevant faces and bore for machining



Completed repair awaiting On-Site Machining division



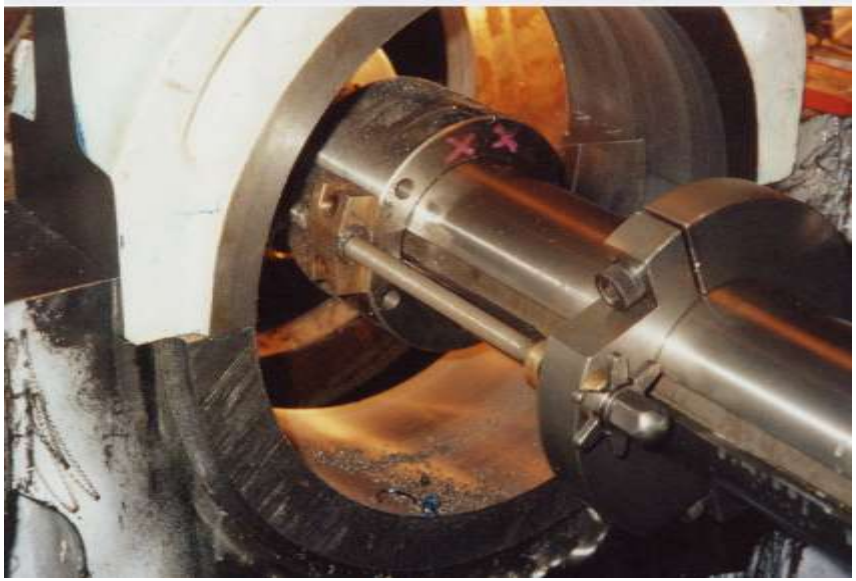
On-Site Machining division mill the top face



With a new bearing cap fitted a boring bar with integral optical targets mounted in the centre of the bar was optically aligned true to the centre line of the undamaged bearing pockets.

A new bearing cap is fitted alignment is checked and the bore machined back to standard

Line boring in progress



The engine was rebuilt, sea trials were carried out the Metalock repair was a complete success and the vessel regained its full classification

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