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O T T A W A

April 11th, 1944.

## R E P O R T

of the

### ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1625.

Examination of Connecting Rod Bearings  
from Ford Vehicle C-118.

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from Ford Vehicle C-118.

Origin of Material and Object of Investigation:

Connecting rod bearings from Ford Vehicle C-118, which had been under heavy duty oil tests in Texas, were submitted on March 17th, 1944, by the Army Engineering Design Branch of the Department of Munitions and Supply, Ottawa, Ontario. (Requisition No. 637, A.E.D.B. Lot No. 529, Report No. 13, Test No. 58.)

It was reported that this vehicle had completed 24,139 miles, the only engine out of 13 to finish the 24,000-mile test run without failure. The oil filter element and crankcase oil were said to have been changed at 4,000-mile intervals.

Similar bearings which failed long before the required mileage was complete had been covered by O.D.M.L. Investigation No. 1605. It was requested that these satisfactory bearings be examined for comparison.

Macro-Examination:

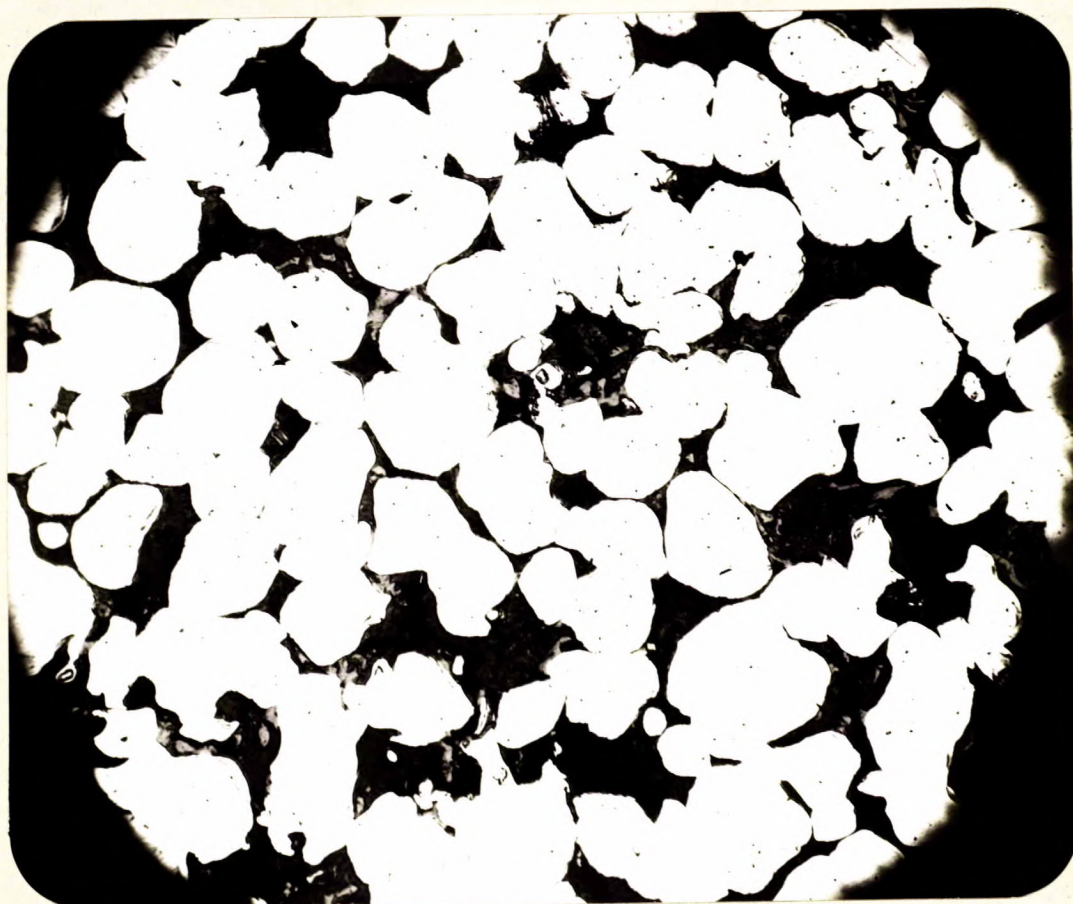
Two bearings were in reasonably good condition and two were rather severely cracked, darkened, and, in places, roughened. It was noticed in each that the bearing had deteriorated more on one side of the annular groove than on the other.



Microscopic Examination:

Specimens for microscopic examination were removed from all of the samples received. No significant difference between the rather severely deteriorated and the reasonably good bearings in this lot was noticed, nor did the bearings appear to be metallurgically superior to those examined earlier. Figures 1 and 2, from a tangential and a radial section, are photomicrographs of the satisfactory bearings. They may be compared with those given for the failed bearings in O.D.M.L. Report No. 1605.

Figure 1.



X250, unetched.

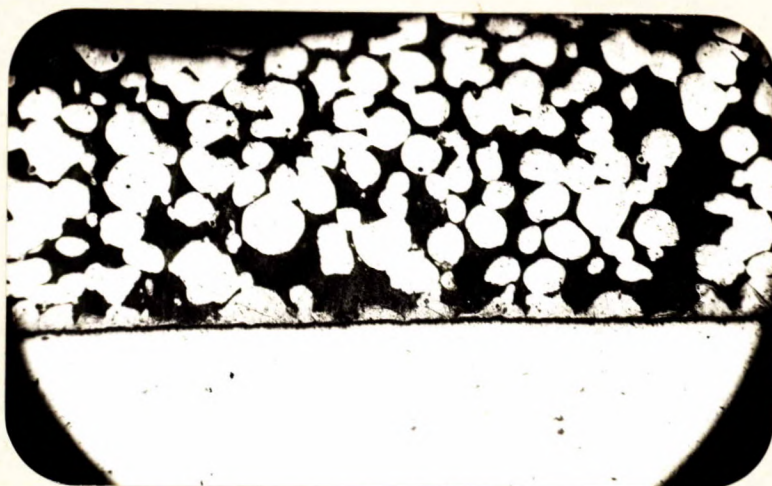
TANGENTIAL SECTION.

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(Microscopic Examination, cont'd) -

Figure 2.



X100, unetched.

RADIAL SECTION.

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Discussion of Results:

In Report of Investigation No. 1605 the opinion was expressed that the failures were primarily caused by factors other than the normal fatigue strength of the bearing or the normal corrosiveness of the oil. The fact that the bearings now reported are not superior metallurgically but still passed the test supports the earlier contention. Also, in this lot of satisfactory bearings no metallurgical difference can be found between those in reasonably good condition and those severely deteriorated.

It is thought that an equal or adequate oil film has not been maintained, especially on the convex surfaces, on the bearings earlier examined and in some of those now reported. This resulted in heat and, consequently, a rise in temperature. Since the lead areas in these bearings are frequently connected



(Discussion of Results, cont'd) -

by lead stringers and since the fatigue strength of this lead falls off rapidly with increasing temperature, the bearings failed by fatigue cracking in the heated areas. Those parts of the concave surface corresponding in location to heated areas on the convex surface were also heated and this resulted in some local corrosion in those places.

These examinations indicate that all bearings would have performed as satisfactorily as the best sides of the two bearings that were received in good condition, had they all had the same mechanical and oil conditions as prevailed for these two.

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