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O T T A W A October 15th, 1943.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1516.

Examination of Two Aircraft Forgings,
Part No. HP-1225.

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Bureau of Mines
Division of Metallurgical
Minerals

Ore Dressing
and Metallurgical
Laboratories

Canada
DEPARTMENT
OF
MINES AND TECHNICAL
SURVEYS
Mines and Geology Branch

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Origin of Samples and Object of Investigation:

On October 9th, 1943, Mr. S. H. Morrow, Inspector-in-Charge, Materials Group, British Air Commission, 5-231 General Motors Building, Detroit 2, Michigan, submitted (with letter, File No. D-M6/VM/8150) two forgings, Part No. HP-1225. These forgings, reportedly made to Specification En 16, were in the hardened and tempered condition. Request was made for an examination of these parts (which were selected at random from a consignment of finished forgings) to determine whether or not they had been overheated during forging.

Macro-Examination:

Both ends of each forging were notched and broken open. The fracture, in all cases, had an appearance intermediate between silky and woody. Figure 1 is a photograph of a typical fracture.

Figure 1.



(Approximately to size).

UPPER HALF OF BREAK IS SAW-CUT
NOTCH; LOWER HALF IS FRACTURE.

The average Vickers hardness (10-kilogram load) of the samples was 315 V.H.N. in one case and 305 V.H.N. in the other.

Micro-Examination:

Samples were removed from both ends of each forging, mounted in bakelite, and polished. Examination of the metal in the unetched and etched conditions failed to reveal positive evidence of incipient fusion or grain boundary oxidation. The structure, as shown at 250 diameters in Figure 2, is a uniform tempered martensite.

(Continued on next page)

(Micro-Examination, cont'd) -

Figure 2.



X250, nital etch.

MICROSTRUCTURE OF FORGINGS.

A small forging lap, about 0.02 inch deep and 3/8 inch long, was noticed, incidentally, in one of the parts.

Discussion of Results:

If severe burning of this sample had occurred, the fracture test would be expected to show a rather coarse crystalline break. Since this was not the case and since the microscopic examination gave negative results, it is concluded that the parts were not burned in forging. In the absence of any incipient fusion, overheating in forging is of no importance, for grain size and structure are only influenced by the temperature at which the forging was finished; moreover, grain size and structure are refined by subsequent heat treatment operations.

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