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OTTAWA July 24th, 1940.

REPORT

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of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 870.

An Examination of an Austenitic Manganese Steel Casting for the Sorel Steel Foundries Limited, Sorel, Quebec.



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DEPARTMENT OF MINES AND RESOURCES MINES AND GEOLOGY BRANCH

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Object of Investigation:

Uneven wear on a mantle used in a 7-inch gyratory rock crusher.

According to a letter from W. J. Riddell, Metallurgist and Chemist, Sorel Steel Foundries Limited,

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Sorel, Quebec, written on July 11th, 1940, this is a serious condition, shortening the useful life of the casting. Two samples were submitted.

No. 260 is the thin side.

No. 208 is the thick side.

These two samples are from diametrically opposed parts of the same casting. No. 260 is from the place of greatest wear.

Chemical Analysis:

Sample	Carbon, p.c.	Manganese, p.c.	Silicon, D.C.	Sulphur, p.c.
No. 260	1.17	13.42	0.70	0.007
No. 208	1.17	13.40	0.71	0.007

Micro-Examination:

Figure 1.

Figure 2.

No. 260. X100. (Nital). No. 208. X100. (Nital).

Special precautions were taken to be sure that the samples were not heated up during preparation.

(Continued on next page)

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Both samples show the presence of free iron carbide at the grain boundaries. The austenite grains are fairly large and slip planes in the grains show that the metal has been subject to cold working. Occasional spots of iron carbide occur within the ferrite grain. There are relatively few non-metallic inclusions.

Discussion of Results;

The chemical analyses are within the limits for austenitic manganese steel as specified by the A. S. T. M.

The coarse austenite grain size would lower the physical properties of the casting. One way of reducing grain size would be to pour at a lower temperature.

The presence of free iron carbide is objectionsble. In order to get these carbides in solution the castings must be heated to a high enough temperature to take all carbon in solution, and quenched fast enough to retain the carbon in solution. It may be that

- (1) quenching temperature is too low, or
- (2) quenching speed is not fast enough.

Although the steel is in an unsatisfactory condition, we have found nothing to account for the unequal wear on one side of the casting.

HHF:PES.