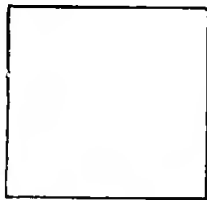


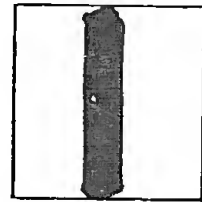
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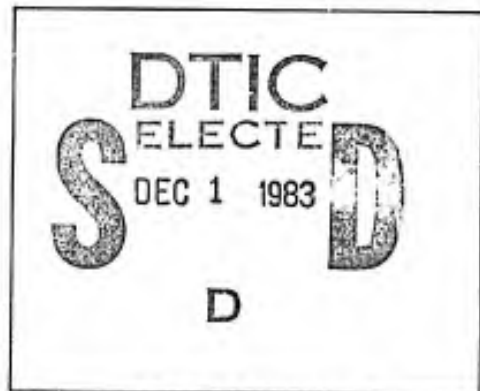
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REPORT NO. 441/1

MAGNAFLUX INSPECTION OF ARMOR CASTINGS

INDEXED

By

A. T. Stamp
Jr. Engineering Aide

September 16, 1936
WATERTOWN ARSENAL
WATERTOWN, MASS.

1/14/44

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September 16, 1936.

MAGNAFLUX INSPECTION OF ARMOR CASTINGS

Magnaflux inspection of the Armor Castings received from Lebanon Steel Foundry was not started until 4 castings had been passed and shipped to Rock Island Arsenal.

In the finishing of the fifth castings, a ball mount bracket which was beginning to show cracks necessitated this type of inspection on all future castings.

The castings which had been rough machined were chosen first in order not to retard the production schedule or shipping dates already in effect at that time. New castings being received at that time were magnafluxed before acceptance. The preparation of these castings for magnaflux consisted of snagging with a grinding wheel in order to produce a clean surface. (This method of cleaning was used throughout on Armor Castings.)

In the application of magnafluxing of another type of castings (Elevating Gear Boxes, Drg.175733), the first group were snagged and the second group were not given any method of cleaning. In the near future more of this type of castings will be received and it is understood that these castings will be sandblasted before being magnafluxed. The time of sand-

blasting and snagging of these types of Armor Castings are very nearly equal and the snagging produces a cleaner and better surface for inspection, however, for shapes having pockets and corners sandblasting is the practicable method of cleaning.

It was found that the cracks which were shown up by the X-ray were internal and usually more than one-eighth below the surface, or in the welds which had to be ground to find the true cracks. Some were even as deep as one quarter inch below surface. Also the X-ray disclosed internal cracks about the middle of the castings which would not show in magnafluxing. Serious surface cracks not disclosed by the initial X-ray inspection were exposed during machining in numerous castings. This unsatisfactory result may be attributed to the limited number of X-ray exposures made. Magnaflux would have instantly disclosed the same defects. On a surface prepared for magnaflux inspection all surface cracks and defects may be found, but for internal inspection X-ray is necessary. The results of such magnaflux work as carried on were:

Ball Mt. Brackets

- 46 - Inspected and repaired.
- 27 - After repairing by welding were rejected by magnaflux and repaired before being sent to X-ray for final examination.
- 38 - Sent to X-ray for examination.

1.- Was scrapped because it was impossible to repair it and eliminate all cracks after trying our several methods of Armor Welding.

In the first inspection by X-ray 35 passed out of the 38.

These were finally passed after being sent back for repair. They were:

#20 - B1739
#32 - B1736
#50 - B1692

Carburetor Covers

There is evidence that the purpose this part has in protecting the carburetor was not fully considered. (Soft plate would probably have served purpose, as outside armor affords protection.)

- 33 - Inspected and repaired.
- 12 - After repairing by welding were rejected by magnaflux and repaired before being sent to X-ray for examination.
- 31 - Sent to X-ray for examination.
- 21 - Passed out of 31 sent.

These 10 were internal defects not disclosed by magnaflux inspection.

These were returned and repaired and all passed by magnaflux and then sent for X-ray examination and all were

passed on second X-ray examination.

These were as follows:

# 6 - B1761	#26 - B1780
#15 - B1775	#39 - B1768
#18 - B1771	#42 - B1757
#22 - B1758	#48 - B1759
#25 - B1762	#53 - B1784

In cases where severe condition of surface cracks appear it would seem advisable to examine, using X-ray method, as usually internal cracks are found under these conditions. In other cases magnaflux method of inspection would incur less handling and therefore less expense.

Comparison of Costs of Inspection of Armor Castings

Cost of X-ray Method Inspection.

Ball Mt. Brackets	4 plates each at \$1.25	= \$5.00 ea.
Carburetor Covers	2 plates each at 1.25	= 2.50
Generator Covers	2 plates each at 1.25	= 2.50

Cost of Magnaflux Method Inspection.

Ball Mt. Bracket

Snagging (CU)	1 hour at .70 + 110%)	- \$2.02 ea.
Inspection	1/2 " at .85 + 30%)	

Carburetor Covers

Snagging (CU)	3/4 " at .70 + 110%)	- 1.68 ea.
Inspection	1/2 " at .85 + 30%)	

Generator Covers

Snagging (CU)	3/4 " at .70 + 110%)	- 1.68 ea.
Inspection	1/2 " at .85 + 30%)	

As faults disclosed often necessitate repair welding some individual items may be reinspected. The number of inspections made must be applied as a multiplying factor to the costs listed.

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