

Report of a Metallographic Analysis carried out in Montreal, in
September, 1967, without any knowledge of the background details
of the piece of metal

Findings

1. The corrosion on the part was slight and only superficial.
2. The specific gravity was very high.
3. The hardness was Rockwell B 9 $\frac{1}{2}$.
4. Chemical Analysis
Carbon 0.16% Manganese 11.3 Sulphur 0.017 NI -- MO -- SI 0.12
FE Ferrous 88.403.

Conclusion

The chemical analysis does not correspond to any commercial manganese steels as they contain either more carbon and silicon or some nickel and molybdenum. The alloy work hardened very heavily during the process of cutting which is inherent to such an alloy.

The slipped lines were more pronounced once nital reagent was used. Since deep electropolishing was used in this instance, it indicates that the material went through heavy impact that caused the different planes to slip.

Comments

1. For a regular manganese steel, the carbon content should be at least 1.6% not 0.16% and the sulphur should be in the neighbourhood of .2%.
2. The fact that this composition does not correspond to any known commercial manganese steel, is in itself very interesting, but it does not exclude the possibility of unpublished new materials being used by either the U.S.S.R. or U.S.A. in their space probes.
3. We can only conjecture regarding the usefulness of the work hardening of the material. Space projectories need material resistant to terrific temperatures and frictions. A material so formulated would indeed help in overcoming these problems.
4. The FE Ferrous percentage of 88.403 may be an erroneous figure since we were unable to make further quality tests, having exhausted the available material.

It is possible there may be an element here that we know nothing about - a most unscientific statement, though.