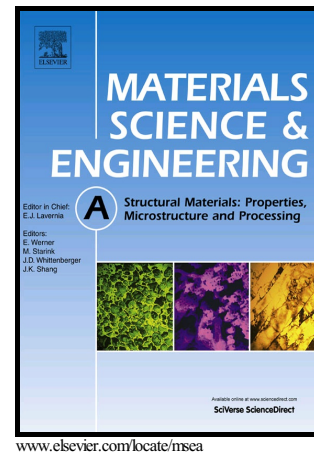


Author's Accepted Manuscript

Effect of composition, heat treatment and deformation on mechanical properties of tungsten heavy alloys

Ashutosh Panchal, T.K. Nandy



PII: S0921-5093(18)31004-9
DOI: <https://doi.org/10.1016/j.msea.2018.07.070>
Reference: MSA36734

To appear in: *Materials Science & Engineering A*

Received date: 22 December 2017
Revised date: 18 July 2018
Accepted date: 19 July 2018

Cite this article as: Ashutosh Panchal and T.K. Nandy, Effect of composition, heat treatment and deformation on mechanical properties of tungsten heavy alloys, *Materials Science & Engineering A*, <https://doi.org/10.1016/j.msea.2018.07.070>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Effect of composition, heat treatment and deformation on mechanical properties of tungsten heavy alloys

Ashutosh Panchal and T. K. Nandy

Defence Metallurgical Research Laboratory, Hyderabad, India.

Abstract:

Five different compositions of tungsten heavy alloy with Ni, Fe, Co and Mo were prepared through powder metallurgy route using liquid phase sintering. Three alloys were based on quaternary W-Ni-Fe-Co (with varying Ni to Fe ratio and Co content) and the other two quinary systems with Mo addition. The sintered alloy blanks (cylindrical cross section) were subjected to a thermo-mechanical treatment, which comprised three vacuum heat treatments (at 1100 °C for 1.5 h followed by oil quenching) before and in between multiple swaging operations (at 500 °C) with a total deformation of 53 %. This was followed by a detailed evaluation of different microstructural parameters in all compositions. Mechanical properties such as tensile strength, % elongation and impact were evaluated at the final stage (26 mm dia and 600 mm length). Increase in Co content resulted in better strength and elongation with marginal loss in impact values. The alloy containing 0.25 wt.% Mo showed the best combination of tensile and impact properties. Further increase in Mo concentration to 0.5 wt.% resulted in marginal increase in strength value but rapid deterioration in elongation and impact values. Scanning electron microscopy, electron probe micro analysis, quantitative metallography and fractography were carried out to establish an inter-relationship between microstructure, properties and fracture behaviour of the alloys investigated.

Keywords: Swaging; Mechanical properties; Heat treatment; Fractography

*Corresponding author. Tel.: +91 9705927595; Fax: +91 4024344535.

E-mail address: ashutoshp.05@gmail.com

Download English Version:

<https://daneshyari.com/en/article/7971670>

Download Persian Version:

<https://daneshyari.com/article/7971670>

[Daneshyari.com](https://daneshyari.com)