
Investigation of mechanical and technological properties of porous meshed material sheets of steel 12X18H10T

© A.F. Tretyakov

Bauman Moscow State Technical University, 105005, Russia

The article describes the study of porous meshed material mechanical characteristics using a structural approach, which involves determining the mechanical properties on the basis of the mesh geometric parameters (standard size), mesh quantity, mutual arrangement, mechanism of plastic deformation and quality of structure-forming element consolidation. It is shown that porous meshed materials made by diffusion welding after mesh chemical treatment has the maximum interlaminar strength for a given mesh briquette design and compression. The dependences for determining strength, plasticity and anisotropy of the porous meshed material in the plane of the sheet under uniaxial and biaxial tension are obtained. It is found that increasing the formability and weldability of sheet blanks is achieved by reducing the strength anisotropy, plasticity and thermal conductivity. To reduce the anisotropy meshes with square cells should be used, their number should be increased, the angle between them should be reduced, and compression in the process of their solid-phase coupling should be increased.

Keywords: porous meshed material, anisotropy, strength, plasticity, deformation rate, welding, sheet-metal forming.

REFERENCES

- [1] Zeygarnik Yu.A., Polyakov A.F., Stratyev V.K., et al. Ispytanie poristogo setchatogo materiala v kachestve obolochek lopatok vysokotemperaturnykh gazovykh turbin [Testing porous meshed material as the shell of high-temperature gas turbine blades]. *Preprint of Joint Institute for High Temperatures of the RAS*, 2010, no. 2–502, 64 p.
- [2] Tretyakov A.F. *Proizvodstvo prokata — Rolled Products Manufacturing*, 2013, no. 5, pp. 32–42.
- [3] Tretyakov A.F. *Proizvodstvo prokata — Rolled Products Manufacturing*, 2013, no. 6, pp. 29–34.
- [4] Tretyakov A.F. *Problemy chernoy metallurgii i materialovedenie — Problems of ferrous metallurgy and material science*, 2016, no. 1, pp. 5–10.
- [5] Tretyakov A.F., Sabelnikova T.M., Kharitonova L.K. *Tekhnologiya metallov — Metal Technology*, 2001, no. 5, pp. 35–38.
- [6] Kurkin S.A. *Prochnost svarnykh tonkostennykh sosudov, rabotaushchikh pod davleniem* [The strength of welded thin-walled vessels, working under pressure]. Moscow, Mashinostroenie Publ., 1976, 184 p.
- [7] Tretyakov A.F. *Proizvodstvo prokata — Rolled Products Manufacturing*, 2015, no. 2, pp. 24–29.
- [8] Tretyakov A.F. *Remont, Vosstanovlenie, Modernizatsiya — Repair, Reconditioning, Modernization*, 2015, no. 1, pp. 22–26.
- [9] Tretyakov A.F. *Nauka i obrazovanie: elektronnyy nauchnoe izdanie — Science and Education: Electronic Scientific Journal*, 2012, no 5. DOI 10.7463/0512.0400624 (accessed May 31, 2016).

Tretyakov A.F. (b.1945), Dr. Sci. (Eng.), graduated from Bauman Moscow Higher Technical School in 1969. Professor, Department of Materials Processing Technology, Bauman Moscow State Technical University. Author of over 150 research publications. Research interests: creating products based on the designed materials with given set of properties. e-mail: tretyakov@bmstu.ru
