

Investigating an invar anomaly in multilayered steels

© M.D. Safonov

Bauman Moscow State Technical University, Moscow, 105005, Russia

The article presents the results of investigating linear thermal expansion coefficient (LTEC) anisotropy in a multilayered metallic material synthesised out of the 08kp and 08Kh18 steels by means of hot pack rolling. We detected anomalously low LTEC values in the direction perpendicular to the rolling plane (ND) of the multilayered material. In order to explain this phenomenon, we propose a hypothesis stating that normal and tangential stresses occurring at the inter-layer boundaries in such a material are linked. The fact that compression stresses caused by the 08Kh18 steel (featuring higher LTEC values) in the direction perpendicular to the rolling plane (ND) greatly affect the 08kp steel, which undergoes the $\alpha \rightarrow \gamma$ transition during heating, supports our hypothesis. We show that a change in volume for the $\alpha \rightarrow \gamma$ transition recorded during heating the 08kp steel greatly increases when this steel forms a part of a multilayered composite.

Keywords: hot pack rolling, multilayered metallic material, rolling direction, dilatometric analysis, linear thermal expansion coefficient

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Safonov M.D., post-graduate student, Department of Materials Science, Bauman Moscow State Technical University. e-mail: MSafonov@bmstu.ru