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Electronic thermography of heat generation when straining steel rods with structural and technological defects

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The paper dwells on deformation heat generation intension rods with structural and technological defects. It provides data on electronic thermography of such rods in the process of stressing. We have studied the features of mechanism of straining of steel samples with constructional and technological notches subject to physicochemical nature of heat generation in shear bands. Wells was the first who paid attention to the correlation between deformation heating and resistance power of structural steel elements. The mentioned fact of the localization of plastic deformations field near notch, heat initiation in that field (due to straining impact) and modification of material mechanical properties under the impact of heat and concomitant processes could be the key for understanding mechanism, revealing resistance power dependence on deflected mode characteristics at notch area, and elements temperature. The energy of mechanic straining of a metal in the vicinity of a defect transforms into heat, which results in quite important average temperature increase in that place. Brock's papers demonstrate that such temperature increase at the tip of a crack, taken with bulk mode of deformation, modifies dynamics of crack extension. The article is written in the form of experimental analysis of interrelation between fracture of tension rods of low-carbon steel St3sp and deformation heat generation, with clarification of the mechanism of heat generation, initiation and expansion of a fracture in the vicinity of structural and technological defects in such rods.

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