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The quenching influence on defect structure and far acting stress fields of the 30CrNi3MoVA steel

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The determination of the quenching influence on defect structure and far acting stress fields of the cast constructional steel 30CrNi3MoVA (0.3%C, 1%Cr, 3%Ni, 1%Mo, 1%V) was the purpose of this work. The samples having the form of ingot with the 80(80(260 mms size, were subjected to previous termal treatment: gomogenization 1125℃, 13 hours, normalization 980℃, 10 hours and high tempering 660℃, 10 hours with cooling on air. Then, the quenching from 950℃ (the endurance 5 hours) with cooling on air has been carried out.

The method of transmission electronic microscopy under great (50000－70000 X) magnification has shown that each crystal of α-matrixe is characterized by the existence of compact dislocation structure. The dislocations evenly fill the crystals forming three dimensional net from sharply twisted and mixed dislocation lines. The contrast on dislocations has a smearing character in consequence of precipitated carbon atoms on them and formed Cottrell and Maxwell atmospheres.

The average dislocation density as a whole on material is equal to 6×10^{14} m $^{-2}$. Herewith the most high value (6.3×10^{14} m^{-2}) it has in lath dislocation martensite but the most low (4.5×10^{14} m^{-2}) in lamellar high temperature martensite.

The quenching is accompanied by the far acting stress fields formation revealing themselves in the manner of extinction bending contours. The extinction contours presence is the result of crystalline lattice bending or crystal α-matrix bending. Herewith only the small part of crystal is found in exact reflecting position. The width of the contour less, the crystal bending more, i. e. the amplitude of the curvature-torsion of the crystalline lattice χ more and, accordingly, the amplitude of stress fiends σ more too.

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