A good deal of research has been done on estimating the susceptibility of steel to brittle fracture from the type of fracture [1-7].

The type of fracture is a rough indication of the ability of the steel to resist fracture, and therefore visual estimation of the quality of the steel from the type of fracture is widely used for comparative purposes. However, the limitation and approximate nature of this method should be kept in mind.

Fig. 1. Variation of fracture toughness (\(a_n\)), its components (\(a_i\), \(a_p\)), and percentage of ductile components in the fracture (% D) with testing temperature.
The fracture surface is the result of developments during breaking. The structure of the fracture depends on the macro- and microscopic processes of plastic deformation and discontinuities in the movement of the main crack. Visual examination cannot reveal the fine structure of the fracture, and thus, it is impossible to estimate the intensity of plastic deformation and the energy content of the process. From the outward appearance one can only classify fractures – fibrous (ductile), crystalline (brittle), or mixed (semi-brittle). These are arbitrary classifications, since each of these groups can be differentiated by microscopic examination or by calculation of the energy of formation of the fracture surface. For example, the work of crack propagation in macrocrystalline fracture can differ. This indicates nonuniformity in macrocrystalline fractures. Ductile fractures may also be characterized by different energies of the process in the stage of crack propagation.