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A STUDY OF DEFORMATION CHARACTERISTICS OF Mn-V DUAL PHASE STEEL

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Abstract

The deformation characteristics of dual phase steels have been investigated. The true stress-strain curves were calculated from conventional stress-strain curves measured in Instron 1251. Three empirical formulae were used to approach these curves and C-J method was used to analyze them respectively. It is found that there is a "double n" characteris tic in the uniform deformation stage. Based on the results of calculation and observation of microstructure,it is suggested that deformation and work-hardening characteristics in the uniform deformation stage of dual phase steels may be described with what we called "Ashby-Mileiko's comprehensive theory", i.e. initial work-hardening due to incompatibility of two phases may be explained by Ashby's theory. After the strain and work-hardening in the ferrite reached to certain extent martensite began to deform. In this stage the deformation characteristic of dual phase steels may be described by Mileiko's theory which has been used to explain the strengthening mechanism of composite. According to this comprehensive theory in order to increase the initial work-hardening rate, and uniform elongation of dual phase steels, it is necessary that under the given reasonable martensite volume fraction, the size of martensite island and ferrite grain should be reduced, the amount of lath martensite in martensite island should be increased and martensite island should be distributed as evenly as possible.

I. INTRODUTION

LOW carbon or HSLA steels which have been intercritically heat treated or specially hot-rolled to produce a martrix of ferrite with 10-30% martensite islands are referred to as dual phase steels. They exihibit continuous yielding, i.e. no sharp yield point, and a relatively low yield stress togrther with a rapid rate of work-hardening, especially initial one, and high elongation (~30%) which gives excellent formability.[1-5]

These characteristics of dual phase steels are closely related to the microstructure features, such as volume fraction of martensite (MVF), the size of martensite island, the fine structure of martensite and ferrite.Some theories[6-10]