

<<超细晶钢>>

图书基本信息

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前言

This book is composed of ten chapters. Based on systematic description of research achievements of the project of ultra-fine grain steels and the engineering applications, new theories of microstructural refinement and the newly developed technologies in production of high strength and high toughness steels are introduced. The book features the integration of materials science with engineering technology. In the scope of theories of the strengthening and toughening of ultra-fine grain steels, the theory of deformation induced ferrite transformation (DIFT) for ferrite-pearlite steels has been put forward. The phenomenon of ultra-fine grain refinement effect by the existing precipitates of nanometer size in the steel produced by using thin slab casting and rolling (TSCR) has been discovered and analyzed. The theory of deformation induced precipitation and medium temperature phase transformation control for bainitic steels has been proposed. The theory of resistance against delayed fracturing of high strength and high toughness alloy structural steels has been established. In the aspect of production technologies, some production technologies for obtaining ultra-fine grains and high strength high toughness of steels are introduced.

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内容概要

Ultra-Fine Grained Steels discusses results of the New Generation Iron and Steel , Materials research project funded over the last ten years. Modern sustainability requirements want that iron and steel must meet four conditions : stronger , longer service life , leading-edge manufacturing technology (low cost , material and energy efficient) , and environmentally sound (waste recycling , reduced carbon dioxide emission) . Therefore , new generation iron and steel materials featuring “ double strength and double service life ” are needed (labeled “ ultra steels ” in Japan) .

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插图：When entering the 1990s, increasingly serious competition was waged among various structural materials. Engineering plastic materials were increasingly applied for longitudinal structures subject to not very high loading. Audi car made of whole aluminum structure did appear in Europe posing threat to cars made of steel structure due to its self-weight reduction, reducing oil-consumption, and alleviation of gas emission. IISI (International Iron & Steel Institute) organized 35steel companies from North America and Europe to jointly start a project on the development of "Ultra Light Steel Auto Body". In the project, it is required that strength level of auto body structure should be increased by 80%, the weight of auto body be reduced by 25%, Oil consumption of family car be reduced to3L/100 km, and the amount of CO2 emission reduced by 2%-3%. The development of high strength automotive sheet steels and longitudinal beam steels and the development of high strength and high toughness sheet steels will increase the competitiveness of steel materials against other engineering materials. The project certainly is an important project contributing to continuous optimization of air environment.

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