New Grade III Rebar Steel Making by Converter with Direct Alloying of Vanadium Pellet

- Study of 20MnSiV Production Experiment

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Abstract The paper focuses on the introduction of the development of vanadium slag and the production of new grade III rebar with V-pellet alloying in converter. Statistics from experiments demonstrate the feasibility of microalloying in practical production and possibility of lower cost of production.

1 Preface

The former Soviet Union began to study the steel making with direct V-slag alloying process early in the 1960's, and conducted alloying treatment by using mixture of vanadium slag and reduction agents in EAF and open hearth furnace, in which the vanadium recovery rate was up to 83%. Since the vanadium resources in China is similar to that in the former Soviet Union, it is quite possible for us to use V-slag instead of FeV in alloying of steels.

In order to properly develop and utilize the rich vanadium resource of our company, we started to conduct experiment production of vanadium bearing steels in EAF with V-slag alloying instead of FeV in the 1970's and attained success, which brought about huge economic benefit for the company.

With development and propagation of new Grade III rebar steel in recent years, we began to research the new route to lower the cost of alloying in production. To produce this type of steel with FeV alloying, though the process is simple, production cost is quite high. With V_2O_5 alloying, operation conditions are very bad on site with serious pollution. In order to take full use of abundant vanadium resource in our company, we conducted an experiment of 20MnSiV steel making by converter with direct alloying of V-slag. After times of experiments with research of optimum production process, we substituted FeV and V_2O_5 with vanadium pellet – a kind of mixture of economic V-slag and reduction agent in alloying and eventually attained success. 20MnSiV steel produced by such process is stable in chemical components, excellent in property and well accepted by customers. The result of experiments shows that to substitute vanadium pellet for FeV or V_2O_5 in alloying of low alloyed steel making is not only technically feasible but economically beneficial.

2 Concept of Alloying with Vanadium Pellet

Conventional alloying: To add alloying element(s) in the form of ferrous alloy or pure metal(s) of alloyying element(s) into molten steel. FeV is used in principle in China. Since electrode consumption and production expenses are rather high in alloying with ferrous alloy, the research and experiment for