

Development Process of High-Silicon Steel Grade 54SiCr6 for Automobile Spring Steel Production With EAF Route, From Scrap Yard to Wire Rod Coil: Lessons Learned and Future Improvements



The article describes the positive experience at Acciaierie Bertoli Safau (ABS) during the development of the whole manufacturing process (from meltshop to rolling mill) of high-silicon grade 54SiCr6 for automobile suspension springs. The evolution of this learning process is presented, with a focus on the implemented aspects (i.e., materials, process parameters, equipment, production scheduling) that proved to be fundamental for the achievement of the product requirements (i.e., steel chemical composition, microinclusion morphology and quantity, blooms and wire rod internal and surface quality). The satisfactory feedback from product performances confirms the effectiveness of the development path and invites future improvements.

Introduction

Acciaierie Bertoli Safau (ABS) is a steel producer located in the north-eastern part of Italy (Friuli region, Udine province) with a total production capacity of approximately 1,400,000 tpy of special steel grades. ABS is the steelmaking division of Danieli Group. It was founded in 1988, after the merging of Officine Bertoli, in operation since 1813, and the Ferriere & Acciaierie S.p.A of Udine (Safau), two historical steel producers in the region.

The plant is equipped with two electric arc furnaces (EAF), three ladle furnaces (LF), three vacuum tank degassers (VTD) equipped with mechanical pumps, three continuous casting machines (MCC) and two ingot casting facilities (IC). It is capable of producing special steel grades ranging from low-carbon grades for structural applications; low-, medium- and high-alloyed grades for case hardening or quench and tempering processes; microalloyed steel; high-alloyed steel; bearing steel; etc.

Downstream the meltshop, the semiproductions (blooms and ingots) can be either sold directly to customers or transformed by one bar mill (LUNA rolling mill for small sections), one reversible mill (MARTE rolling mill

for medium section), one wire rod mill (QWR Quality Wire Rod mill), and one forging plant. Heat treatments and finishing mills for spheres or bright bar production complete the wide product portfolio of ABS. The whole production is supported by an internal metallurgical laboratory and ABS Centre Métallurgique (ACM) as research and development center located in Metz, France.

Nevertheless, even if the special steel production process is well established and takes benefits from the experience gained over the years, it might seem trivial, but the statement “you never stop learning” has never been so true.

This is what happened at ABS when, after the greenfield installation of the new wire rod mill (QWR) and following approach of new markets and customers, a big effort by all departments was made to develop from zero a production process of new steel grades never produced at ABS and capable of fulfilling all the quality requirements of the customers.

This article describes this development process that, for obvious reasons, was not immediate but characterized by a step-by-step learning curve based on a “trial-and-check”

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