Micro-structural Analysis of High Manganese Steels Using Multiple Line Profile Analysis

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High manganese steels have excellent mechanical behavior. It is mainly due to planar faults formation during deformation. So, it is important to know the amount of planar-defects as strain increase. Conventionally there was a method to characterize this kind of defects using diffraction line profile analysis by examining the asymmetry, displacement and broadening of the Bragg peaks.

For a cubic crystal, the third order of any simple reflection is always buried under another reflection at the same position and of higher multiplicity. Therefore, in order to use multiple line profile analysis to calculate the planar defects/ micro-strain and domain size, we had to conduct high energy scattering experiments to get the fourth order reflection data.

We had increased planar defects using tensile tests and then performed high energy scattering experiment to analyze the defects of high manganese steels. With the scattering data, firstly we de-convoluted instrumental broadening and displacement of the Bragg′s peaks, and then analyzed the anisotropic broadening of the peak to extract crystallite size/ micro-strain and planar defects information after Rietveld refinement

Key words: TWIP/ TRIP, Rietveld, Planar defects, multiple line analysis