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# Comparative study of microstructure & mechanical properties of plain wire rod and TMT wire rod manufactured at Bhilai Steel Plant (BSP), India

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## Abstract

Thermo mechanically treated steel is a high-strength steel having superior properties such as high weldability, strength, ductility and bendability. This research studies the different microstructures developed in Thermo Mechanically Treated (TMT) wire rod and plain wire rod at BSP, India, due to differences in their treatment and cooling processes, which results in better mechanical properties such as ultimate tensile strength (UTS), yield strength (YS) and ductility in TMT wire rod. In Wire Rod Mill, during thermo mechanical treatment of wires, the steel wires are made to pass through a specially designed water-cooling system where these wires are kept for such a period of time that the outer surface of wires become colder than the core, which remains hot. This creates a temperature gradient in the wires. When the wires are taken out of the cooling system, the heat flows from the core to the outer surface causing further tempering of steel wires thereby helping them to attain higher yield strength. During micro-structure study of the samples, it was observed that in TMT wire rod, the periphery consists of Tempered Martensite structure while the core is of Fine Ferrite and Pearlite. In case of the plain wire rod, the core and the periphery both consist of the Coarser Grains of Ferrite and Pearlite. Due to the presence of tempered martensite, the YS and UTS are higher in TMT as compared to plain wire rod. The finer grain in the TMT wire rod is also responsible for the higher YS and UTS as compared to the plain wire rod.

## Biography

Aparna Lohiya has completed her Bachelor of Technology at the age of 22 from National Institute of Technology Raipur and presently pursuing MBA in Operations Management at Kansas State University. After her undergraduation, she has worked in top Iron and Steel Industries in India (Essar Steel Private Limited and Vizag Steel Plant) for five years. She was involved in operation of Blast furnace and LD Converter Furnace.