

## **EFFECT OF BORON CONTENT ON METALLURGICAL AND MECHANICAL CHARACTERISTICS OF LOW CARBON STEEL**

**M. EL-SHENNAWY<sup>1</sup>, A. I. FARAHAT<sup>2</sup>, M. I. MASOUD<sup>3</sup> & A. I. ABDEL-AZIZ<sup>4</sup>**

<sup>1</sup>Department of Mechanical Engineering, Faculty of Engineering, Helwan University, Helwan, Cairo, Egypt

<sup>2</sup>Central Metallurgical Research and Development Institute (CMRDI), Helwan, Cairo, Egypt

<sup>3,4</sup>Industrial Engineering Department, Faculty of Engineering, Fayoum University, Fayoum, Egypt

### **ABSTRACT**

Low carbon bainitic micro alloyed steels containing Nb, Ti and V are widely used for the pipeline, construction and automobile industries because of their excellent combination of strength, toughness and weld ability. Adding boron to this type of steel improves its hardening ability by promoting bainite or martensite formation. This work aims at finding out the effect of different boron content on metallurgical and mechanical properties of low carbon steel. Three alloys were cast with different boron content. Dilatation studies were carried out on these alloys to determine critical transformation temperatures. Tensile, hardness and impact tests were conducted at room temperature. Metallographic investigation using optical and scanning electron microscopes was carried out. Results showed that boron has a strong effect in refining microstructure and ferrite-pearlite features such as layer thickness and distribution. Dilatation behavior exhibited the changes of transformation temperature such as austenite-ferrite, bainite and martensite transformation temperatures.

**KEYWORDS:** Metallurgical and Mechanical Characteristics of Low Carbon Steel