

Effects of Heat Treatment on the Properties of SS440C for Blades Applications

Abstract

SS440C steel is commonly used for knife blades, bearings, valve parts, and medical equipment. The composition of SS440C steels is designed to increase hardness especially in blade applications. The effect of quenching and tempering heat treatment on the properties of SS440C was investigated in this study. Quenching heat treatment is done at 1000 °C, followed by tempering at 150 and 500 °C in a muffle furnace. Microstructure of SS440C samples were studied using an optical microscope (OM) and scanning electron microscope (SEM). Properties of SS440C after heat treatment have been investigated using the Rockwell hardness test and tensile test. It was found that the sample quenched at 1000 °C (without temper) had the highest hardness with 58.4HRC, while the as-received annealed sample had 11.4HRC followed by sample tempered at 150 °C with 57.5HRC and 500 °C with 54.1HRC. Tensile testing reveals that quenching and tempering at 500 °C result in the highest maximum stress compared to other samples. Through optical microscopy observation, a sample tempered at 500 °C has larger size of carbide precipitate than sample that quenched and tempered at a 150 °C. Insufficient carbide dissolution or a more abrasive reaction is revealed by larger carbide sizes. In conclusion, SS440C temper at 500 °C reflects that it has better properties than the other.

Keywords

Quenching; SS440C; Tempering