

Microstructural evolution of 25Cr duplex stainless steel upon shot peening treatment

Shin, K.¹ and Liu, S.¹

¹ Changwon National University, Republic of Korea

Shot peening treatment has been widely investigated in varieties of materials (i.e., alloys, cast iron, etc.) as an effective way of surface modification to improve the performance of materials (i.e., corrosion resistance, fatigue resistance, wear resistance, etc.). In this study, Ultrasonic Shot Peening (USP) has been applied to 25Cr duplex stainless steel for investigation of the microstructural evolution of the materials. 25Cr duplex stainless steel widely used for oil delivery pipes for its high corrosion resistance and high strength. In other words, this kind of material is usually surrounded by the insulated environment under high pressure from inside and even causes the failure of the structure due to pitting effect. Hence, improvement of the corrosion resistance of such materials is under focused study.

The 25Cr stainless steel has been heat treated at 1070°C for 1 h before shot peening. Cross section electron backscattered diffraction (EBSD) analysis was used to investigate the phase fraction of austenite and ferrite. Specific depth transmission electron microscopy (TEM) analysis was applied to the characterization of the evolution of microstructure. The hardness of the shot peened specimen was tested upon microhardness test for the variation of the microhardness with distance. The detailed microstructural evolution of 25Cr stainless steel will be discussed.