

Fatigue life and surface integrity measurements of EN S355J2 steel used in hydraulic components

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This article is aimed at studying the impact of surface integrity – surface roughness, hardness and residual stress – on fatigue performance of EN S355J2 steel. The test specimens were manufactured by turning. A longer fatigue life for the machined components can be obtained by applying such cutting conditions as a low feed rate. The fatigue limit of the specimen with the surface roughness Ra 1,6 µm is approximately 7 % higher than that of the specimen with Ra 3,2 µm. From the residual stress results it can be seen that the cutting conditions used for producing surface finish Ra 1,6 µm will introduce mainly compressive residual stress whereas the cutting conditions used for producing surface finish Ra 3,2 µm will introduce tensile residual stress. The measurements were carried out at Aalto University at the Departments of Engineering Design and Production and Material Science and Engineering in Espoo. The main purpose of the study is to find proper surface finishing techniques and fatigue improvements for hydraulic components.

Keywords: fatigue life, roughness, hardness, residual stress, Wohler curve (S-N curve)

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