

EFFECT OF RESIDUAL STRESSES ON FATIGUE STRENGTH OF SEVERE SURFACE DEFORMED STEELS BY SHOT PEENING

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The compressive stress distribution below the specimen surface of severe surface deformed steels by shot peening was investigated by using laboratory X-ray and high-energy X-rays from a synchrotron radiation source, SPring-8 (Super Photon ring-8 GeV) in the Japan Synchrotron Radiation Research Institute. Medium carbon steel plates were heat treated in two different conditions. The Vickers hardness after heat treatment is 408 and 617 HV. The specimens were shot-peened with fine cast iron particles of the size of 50 μm . The coverage was 5000%. The compressive residual stress on the specimen surface measured by laboratory X-ray is -684 and -1240 MPa, respectively. For the synchrotron radiation, by using the monochromatic X-ray beam with several energy levels, the stress values at the arbitrary depth were measured by the constant penetration depth method. The real stress distribution was estimated by using the optimization technique. The peened specimens were fatigue by four point bending. The improvement of fatigue strength of the soft steel was not so large because of large surface roughness. On the other hand, for the hard steel, the surface roughness was smaller and the fatigue strength was higher than that of non-peened steel.