Abstract

A structural steel component that failed under fatigue was examined with the aim to identify the root causes of this failure. Fractographic examination revealed the presence of multiple beach marks; the position and arrangement of those signified the occurrence of fatigue fracture under the presence of combined loading conditions, involving torsion and bending stress components. Crack initiation was observed also at the corners of the steel plate where non-metallic inclusions were located. Stereo-microscopical examination of the fracture surface likely revealed the presence of casting inclusions, probably fluxes or slag particles, near the surface and in the interior of the component. These inclusions could be considered inherent—metallurgical stress raisers, behaving as locations of prominent crack nucleation under cyclic fatigue loading, stimulating subsequent crack propagation and final ultimate rupture.