

X-ray Fourier Analysis on Rolling Contact Fatigue Layer Formed in Rail

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Crystallite size and dislocation density in RCF (rolling contact fatigue) affected layers have been identified using x-ray Fourier analyses for the serviced rails. The evaluation of crystallite size and dislocation density is based on the modified Williamson-Hall and Warren-Averbach models. This evaluation enables to provide a quantification of the microstructural evolution in the RCF layer with the increase of accumulated loading as well as an identification of the most deteriorated locations in the RCF layer. In summary, the surface layer experiences the highest deterioration in all evaluated cases. Furthermore, the accumulation of loading (in terms of MGT – Million Gross Tonnes) increases the depth of the surface RCF layer.