

INTERPRETING THE RADIATIVE PROPERTIES OF ADVANCED HIGH STRENGTH STEELS USING THE KIRCHHOFF-HELMHOLTZ MODEL

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ABSTRACT. This study investigates the relationship between surface roughness and spectral reflectivity of DP980 steel. Four surface states were considered: as-received, polished, roughened, and as well as that of an annealed sample. Radiative properties and surface profiles were measured by an FTIR spectrometer and optical profilometer, respectively. These measurements were interpreted in the context of a theoretical relationship derived from the Kirchhoff-Helmholtz model. The polished sample most closely matches this theory, and the remaining samples become more aligned with this relationship after large-scale roughness has been removed from the profilograms using a wavelet filter. The results also highlight the fact that E-M wave scattering is dominated by small-scale roughness as opposed to macroscopic artifacts.