

Contact fatigue & wear of roller mills. Influence of hardfacing microstructure and residual stresses

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The Horomill® grinder is a horizontal roller mill in which the material is ground between a shell and a roller grinding sleeve. The grinding pressure is applied on the material bed by means of hydraulic jacks.

The surface of the sleeve is subjected to abrasive wear. In order to control the wear of the part and to increase its service life, hardfacing is used. Besides the wear, the sleeve is also submitted to considerable cyclic contact loads and to residual stresses. These result from the shrinking of the sleeve on the shaft as well as from the hardfacing operation.

Fatigue crack growth affects Horomill grinders during operation which can result in local damage. Observations of cracks have been realized to identify the crack growth behaviour in the sleeve. The aim of this study is to assess the influence of the loading parameters (combination of residual and operating stresses) that are responsible for such damage.

Two approaches are being handled in order to improve the fatigue life of such parts. The first consists in studying various hardfacing processes in order to get the most favourable residual stress profile. The second aims at testing (by finite element modelling) different shapes of the sleeve, which needs an accurate model enabling to determine the fatigue life of such shrink-fit parts.