The Hydrodynamic Lubrication in a Globoid Wormcompressor.

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ABSTRACT

The hydrodynamic lubrication of the teeth in a globoid wormcompressor is the subject of this thesis. The lubrication of these teeth varies from the well-known lubrication of bearings. The differences can be related to the geometry and to the conditions of the lubrication.

The geometry of the globoid worm determines the geometry of the lubricating film. Increased wedge angles and decreased wedge length to film thickness ratios, resulting in increased contraction ratios are the main differences of the geometry of the lubricating film. The differences of the conditions of the lubrication are caused by increased sliding velocities and by the static pressure due to the compression in the globoid wormcompressor. Under these circumstances the effect of convective fluid inertia will be important in determining the performance of the lubrication. The lubrication, including inertial effects, of the flanks of the teeth was studied both theoretical and experimental in this thesis.

A complication is caused by the variations of the film geometry’s and the conditions of the lubrication due to the variations of the geometry of the globoid worm. Both flanks of each tooth will be lubricated. The combination of the lubrication of all co-operating teeth defines the distribution of the clearances. This distribution, however, will be varying due to the variations of the film geometry and the conditions of the lubrication.

The variation of the distribution of the clearances will be repeated during one revolution of the wormwheel. The determination of the recurrent variation of the clearance distribution is the main object of this research.