

## Influence of sliding bearing parameters on the dynamical behavior of external gear pumps

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*Abstract:* Variable forces resulting from pressure as well as from the interlocking of teeth in the gearing are responsible for the vibration and noise development in gear pumps. These various forces are transmitted to the housing and cause it to vibrate, as well as surrounding elements like electric motor, valves, tank and piping system. With increasing speed and pressure the dynamic loads on the gears and the dynamic bearing forces increase accordingly. The resulting bearing forces are obtained by addition of the pressure force components and the teeth contact forces in the x and y-direction. In the paper the influence of excitation forces from the pressure on the vibration of gearwheels and dynamic loads in the external gear pumps have been evaluated by digital simulation. For the simulation of the dynamical model MatLab Simulink and LMS-VirtualLab have been used. In VirtualLab the combination of rigid body elements (gears) and elastic FE elements (gear wheels) have been considered. For the modeling of sliding bearings in the gear pump an elasto-hydrodynamic oil film model (EHD) has been used. The EHD model is able to completely describe the dynamic properties of the oil film in the lubrication gap of the bearings. The description is based on the solution of the Reynold's differential equation and its coupling in the FE modeling.

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