# Friction-energy-based wear calculation approach for chain joints

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The continuous advancement of chain drives always focuses on increasing service life and efficiency. In order to achieve these goals, a deeper understanding of the tribological processes occurring in the chain joint is particularly necessary. Various experimental and simulative research methods are used for this purpose. Chain joints consist of several components. The main focus is on the contact between pin and bush, since wear here has a direct effect in the form of elongation of the entire chain and thus on the service life of the chain drive.

In this work, elastohydrodynamic lubrication (EHL) simulation is used to calculate the pressure distribution and film thickness in the lubricated contact of chain joints, taking into account surface structuring and lubricant properties.

By linking the experimentally obtained data regarding the friction and wear behavior with the simulatively determined contact conditions within the chain joint, a friction-energy-based wear calculation approach is built up. The consideration of real component contours from tactile measurements as well as the integration of data from real surface sections of the contact areas allow knowledge gains regarding the wear behavior of chain joints. The wear distribution on single chain joints is obtained instead of looking at the mean wear of a whole chain drive. In particular, production-related deviations in the shape of the bush can be efficiently investigated and their primary effects on the running-in wear behavior can be clarified. The comparison between experimental and simulated observations shows good agreement with regard to the parameters run-in wear amount, run-in half-life and steady-state wear rate for an oil lubricated roller chain. Thus, extensive experimental endurance tests can be reduced and an estimation of the service life can be made with only a few physical examinations.

**Keywords:** chain drive, wear, EHL simulation, wear simulation, chain joint tribometer

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**What is new?** Simulation of local wear distribution, combination of EHL simulation and wear simulation of chain joints

**Related publications:**

Meffert, D., Oehler,. M., Sauer, B.: Precise friction measurement in drive chains using a chain joint tribometer. Tribology Online 16/3 (2021), p. 151-158

Simo Kamga, L; Oehler, M; Sauer, B.; Characterization of the Viscoelastic Behaviour of Gears Oils by EHL Simulation. 14th World Congress on Computational Mechanics (2021)