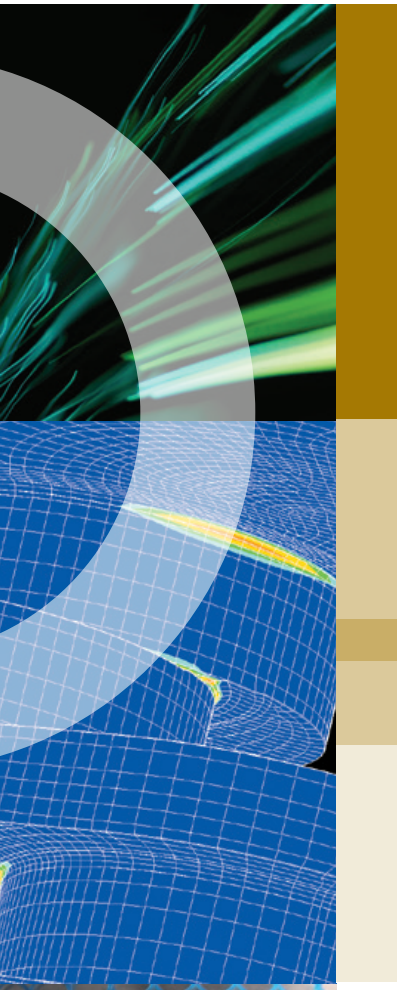
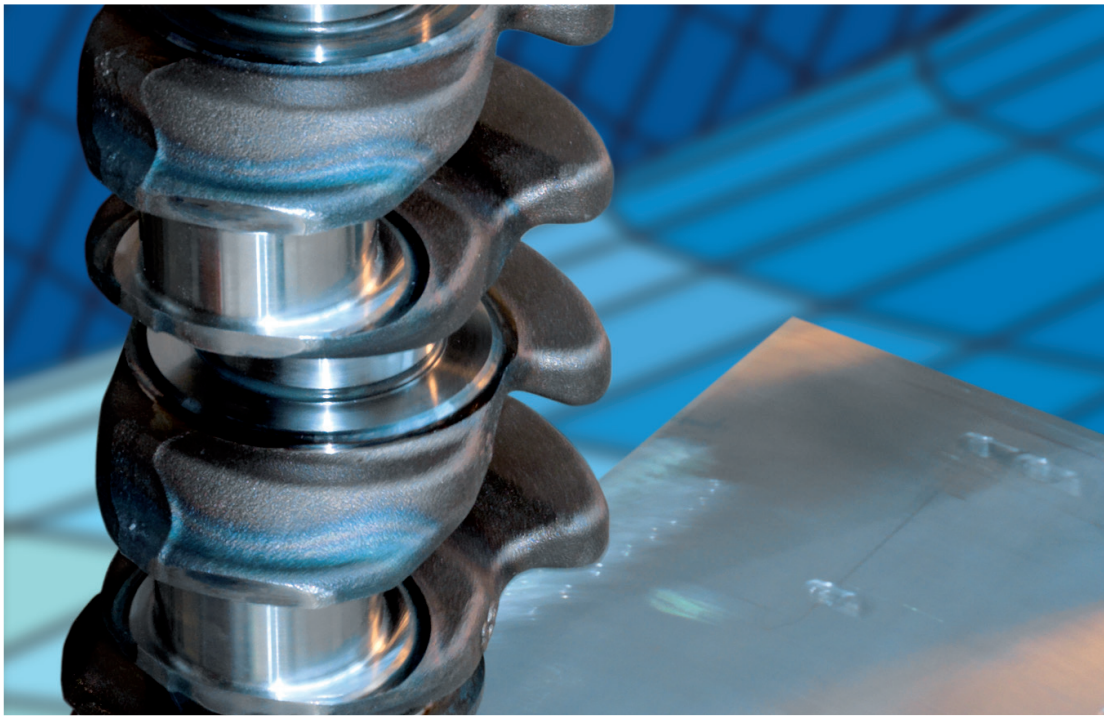
MAGNA

MAGNA POWERTRAIN

Engineering Center Steyr





Hydro Elastic Journal Bearing Simulation

- Elastic-hydrodynamic journal bearing simulation in MBS
- Efficient modal approach
- Interface to MSC.ADAMS and RecurDyn with user-friendly Integrated GUI
- Consideration of lubricating grooves

MEHD software

MODAL ELASTO HYDRO DYNAMIC

mehd.ecs.steyr.com

MEHD is an efficient journal bearing model for MBS simulations. It is based on a numerical solution of the Reynolds equation. An iterative approach, specially designed for MBS simulations, is used to solve it.

If required, characteristic bearing parameters are stored in a separate output file and can be imported directly into the corresponding MBS software postprocessor, or be post-processed using other tools. A user-friendly GUI simplifies bearing modeling. MEHD provides interfaces to RecurDyn, as an integrated solution, and to MSC.ADAMS, through a separately available subroutine.

Method

MEHD is available in form of a subroutine for RecurDyn and MSC.ADAMS.

Features:

- User-friendly GUI
- Consideration of lubricating grooves in the form of pressure boundary conditions
- Characteristic bearing parameters can be saved in an output file, if required
- Efficient modal approach
- Three modeling levels:

Voigt-Kelvin- substitute model

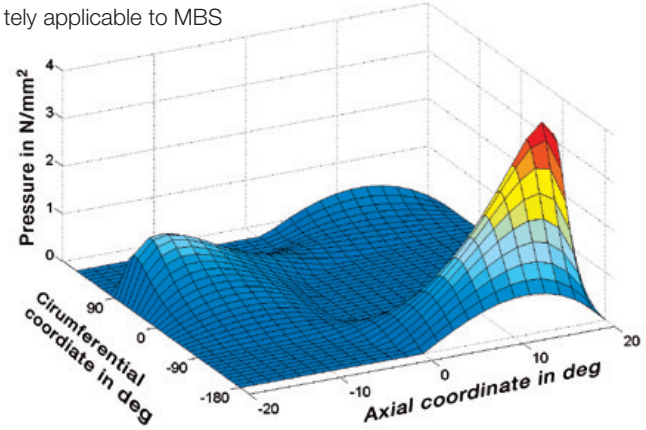
The bearing model is replaced by linear stiffness and damping parameters, which are analyzed using the (e)HD model at a particular working point. Simulation times can be reduced considerably using this model.

(e)HD model

The pressure distribution in the bearing and the resulting bearing forces are computed based on a numerical solution to the Reynolds equation.
The iterative approach is particularly suited to the requirements of MBS simulations. Using this method it is possible to perform run-up simulations (e.g. for crank drives) in less than 10 hours, taking bearing dynamics into consideration.

MEHD Model

In this model, local elastic deformations of the bearing shell are taken into consideration in addition to the (e)HD model. Pressure distributions and bearing loads are simulated with substantially greater precision. An efficient modal approach reduces the number of degrees of freedom to a minimum and therefore also reduces the simulation time. This detailed model is therefore also completely applicable to MBS

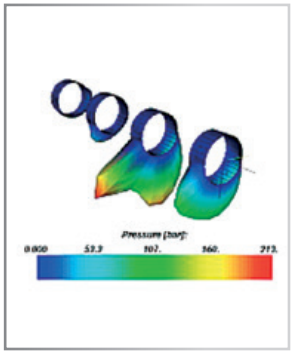


EHD pressure distribution

Evaluation:

The following parameters can be stored in an output file if required:

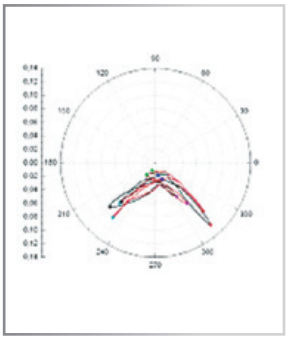
- Journal displacement
- Journal displacement speed
- Bearing forces and torques
- Minimum lubrication gap
- Maximum bearing pressure
- Sommerfeld number
- Pressure and gap height distribution in the MEHD model



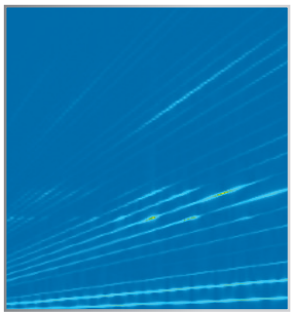
EHD pressure distribution

These bearing parameters can either be processed directly in the MBS software postprocessor or with other tools as follows:

- Bearing parameters, such as journal displacement orbits, can be created directly in the postprocessor after importing the MEHD output file.
- Pressure distributions can be represented in the MBS simulation animation
- The simulaton results can be processed directly in FEMFAT. This allows reliable life time predictions, e.g. for a crankshaft or conrod.
- Dynamic effects can be represented in Campbell diagrams.



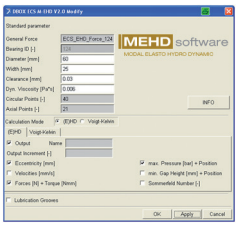
Global dislocation orbit



Campbell diagram

Benefits

- Easy-to-use GUI integrated in the MBS software.
- Efficient, resource-saving formulation of the (e)HD and MEHD algorithm.
- Lubricating grooves can be taken into consideration.
- Bearing parameters can be easily saved and processed.



Interface to MSC.ADAMS

Interfaces

- MSC.ADAMS (WIN32, WIN64, LINUX64)
- RecurDyn (WIN32, WIN64)

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