

USE CASE

Gearbox Lubrication

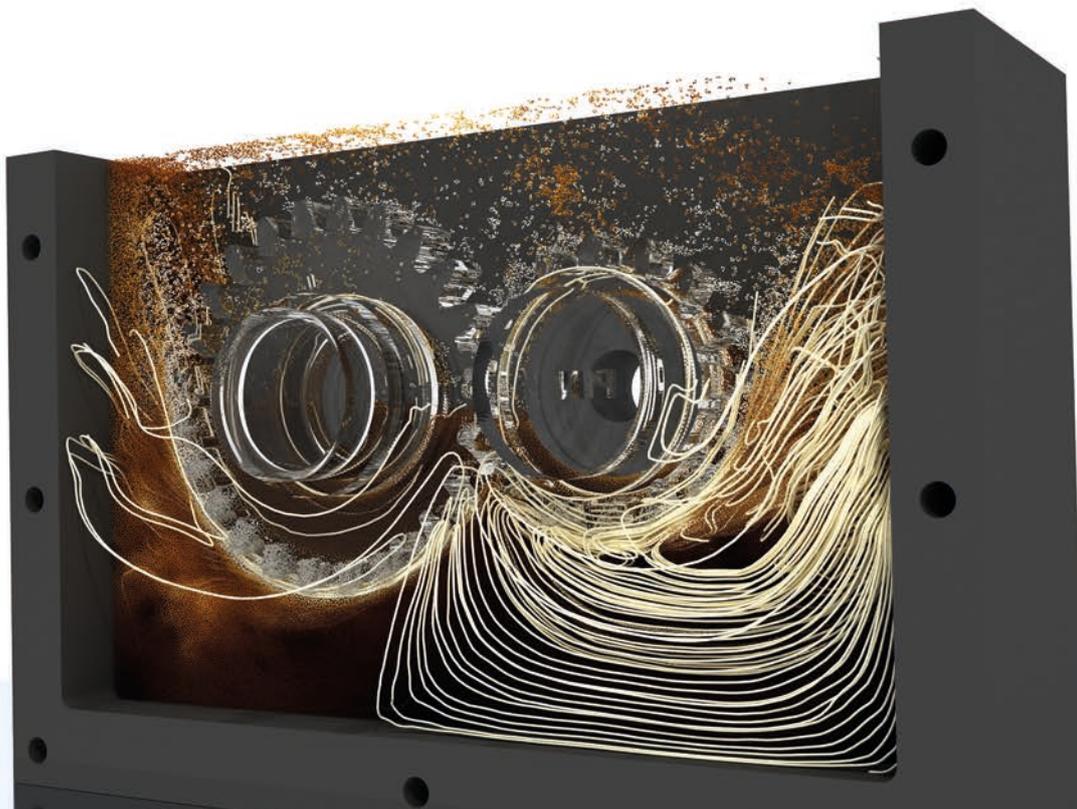
D I V E
SOLUTIONS

*Simulation and Analysis of Fluid Flows
around Complex Moving Geometries*

Due to continuous development, modern transmissions have efficiencies of over 99.5 percent. However, with power transmissions in the megawatt range, the optimization of the remaining percentage points and the increase in service life continue to play an important role. Numerical fluid dynamics (CFD) is increasingly being used to analyze complex flow processes in these systems.

Conventional mesh-based CFD-methods require continuous remeshing for highly dyna-

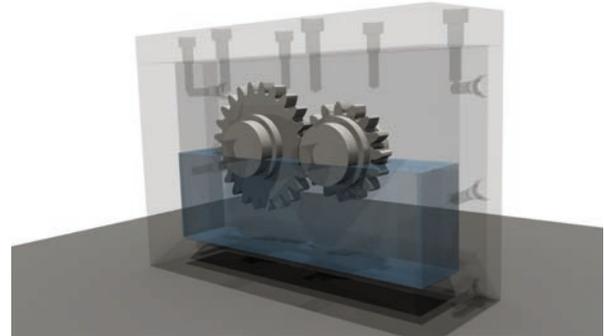
mic processes in gearboxes, leading to high computing times. The modern alternative is the Smoothed Particle Hydrodynamics (SPH) method used by dive solutions. The representation of the fluid as an ensemble of freely moving particles drastically simplifies the treatment of moving geometries. This ensures optimal lubrication at all operating points.



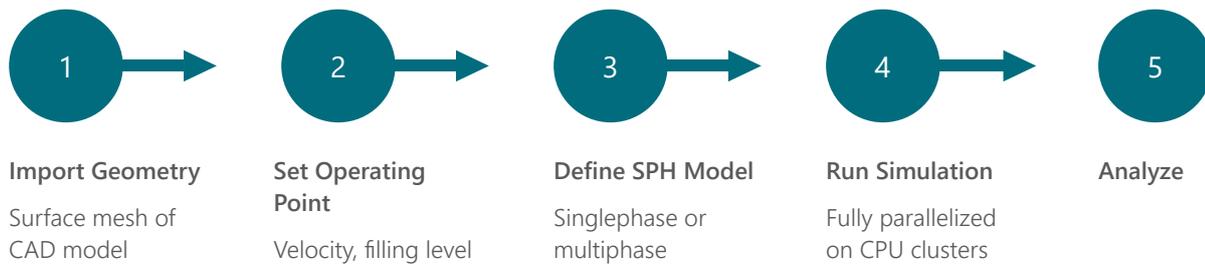
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The splash-lubricated FZG test gear of the TU Munich serves as a basic model for many CFD studies. Due to its standardized structure and the large number of measurement data already available, it offers favorable conditions for validation.

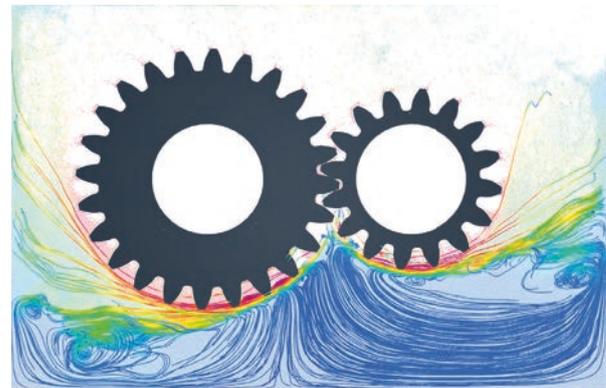
The FZG test gear consists of a cuboid housing with a glass front and a gear stage (see illustration on the right).



SIMULATION PROCESS



Velocity field in oil bath.



Streamlines in oil bath.



Optimal lubrication ensured in all operating conditions.



Minimal preprocessing effort due to mesh-free workflow.



Accurate simulation of highly complex multi-phase system.

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