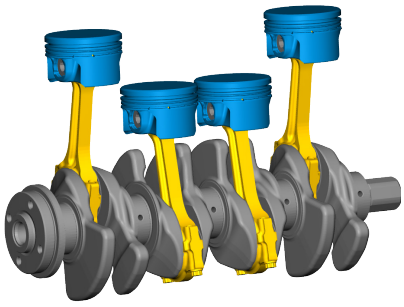


Cranktrain Design Analysis

Cranktrain Dynamics, Balance, Mounts, and Bearings

GT-SUITE offers a complete range of solutions and models for the analysis of cranktrain systems in order to address issues with balance, vibration, friction, lubrication, and durability. This dynamic tool provides a platform to model any cranktrain configuration with fast model setups. Cranktrain models can be easily integrated with a variety of GT-SUITE models including combustion, valvetrain, hydraulics/lubrication, and vehicle drivetrain to investigate system interactions.



Highlights and Advanced Features

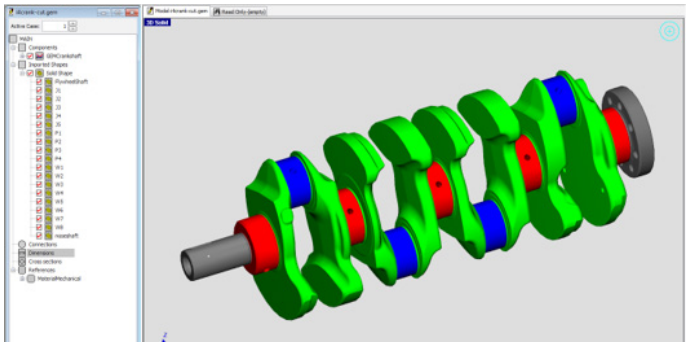
- Easy-to-use cranktrain toolbox for quick layout of any cranktrain
- 1D models generated from 3D CAD
- Study of unbalanced forces/ moments/ torque in engine
- 3D block vibrations and mounting system analysis
- Time and frequency domain for 1D Torsional Models
- Elasto-Hydrodynamic (EHD) Bearing models
- Reduced flexible modeling of cranktrain components (crankshaft, block, conrod)

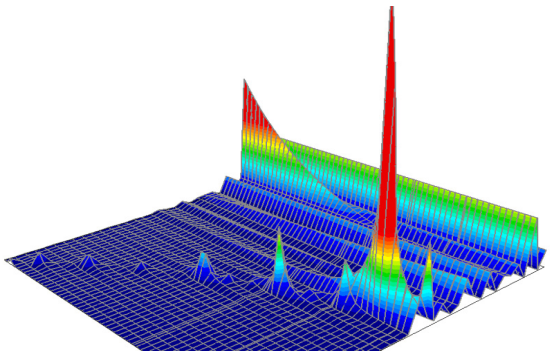
Since 1994, Gamma Technologies has set the standard in system simulation, thanks largely to solving deep multi-physics with an easy to use interface. GT-SUITE's multi-physics approach to simulation empowers engineers to tackle their design and modeling challenges at every stage of the development cycle.

GT-SUITE Solutions

Crankshaft Dynamics

- Simulate vibration and dynamics, as well as tribological and structural effects of pressure and inertia loads on cranktrain and engine blocks
- Automatically generate crank model from CAD to build models in minutes and eliminate potential user input errors
- Use kinematic cranktrain models to evaluate balance and block vibration with mount placement
- Model 1-D torsional crankshafts using the same basic components
- Apply bending crankshaft models (beam or superelement-based) to accurately distribute loads to bearings



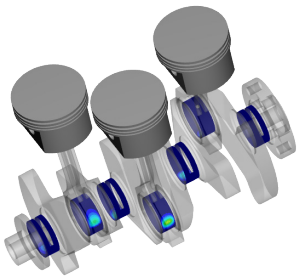


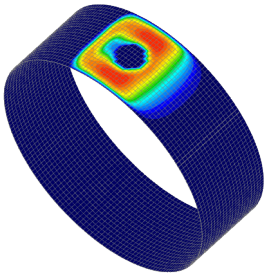
Torsional Dynamic Analysis

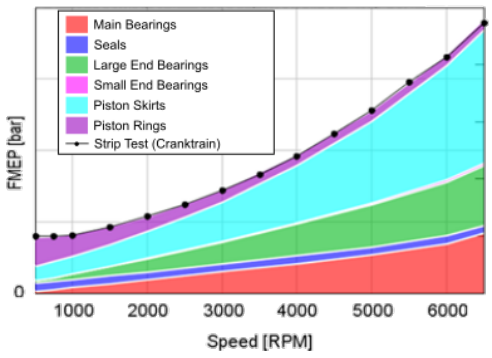
- Perform torsional analysis in time and frequency (free and forced analysis) domains
- Identify and remedy undesirable resonances by accessing results of maximum displacements, stresses, and internal energy of the entire torsional system
- Introduce nonlinear components, like rubber dampers with temperature dependence, for both time and frequency domain solutions
- Extend models beyond crankshaft to include timing drives, accessory drives and drivelines to evaluate interactions and isolation through arc springs, pendulum absorbers, etc.

Bearing Models

- Integrate main and conrod bearings, of varying fidelity, with cranktrain dynamics to perform initial dimensioning (w/ Mobility) or failure analysis (w/ EHD)
- Link bearing models to a full lubrication circuit model to predict loads, orbits, oil flow and temperature, friction torque, and power loss
- Generate 3D animations of pressure, shear stress, deformation, asperity contact pressure, etc. and overlay these animations on cranktrain parts for easy interpretation







Predictive Friction

- Enter user-defined surfaces, roughness and micro surface definitions for skirts, rings and cylinders used for oil film and asperity contact solutions
- Utilize a database of oils that includes temperature, pressure and shear rate on viscosity, or characterize oils with viscosity tables or equations
- Easily generate “strip-down” equivalent results at different temperatures and loads with the complement of available journal bearings, roller element and seal models

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