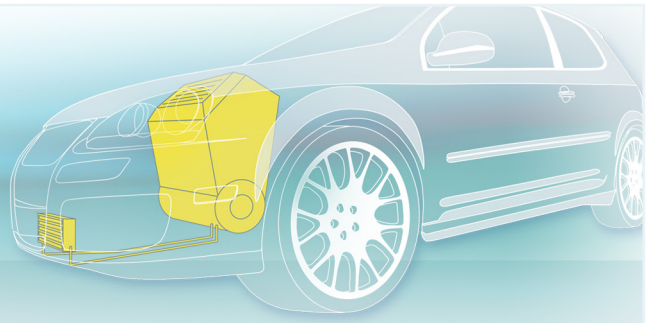
Automotive System Simulation

Lubrication Systems



Technical Flyer

Features

- Model heat transfer effects for both Steady State and Transient flow conditions using a wide range of heat transfer options
- A wide range of standard and lubrication specific components
- Lubrication specific help and tutorials to help users understand best practice and get up to speed as quickly as possible
- Co-simulate with other industry tools such as ANSYS Fluent, STAR-CD and MATLAB®/Simulink®

Benefits

- Quickly and accurately predict system-wide lubrication flow rates, pressures and temperatures for critical design cases
- Investigate, optimise and validate the performance of lubrication systems for complex mechanical powertrain systems

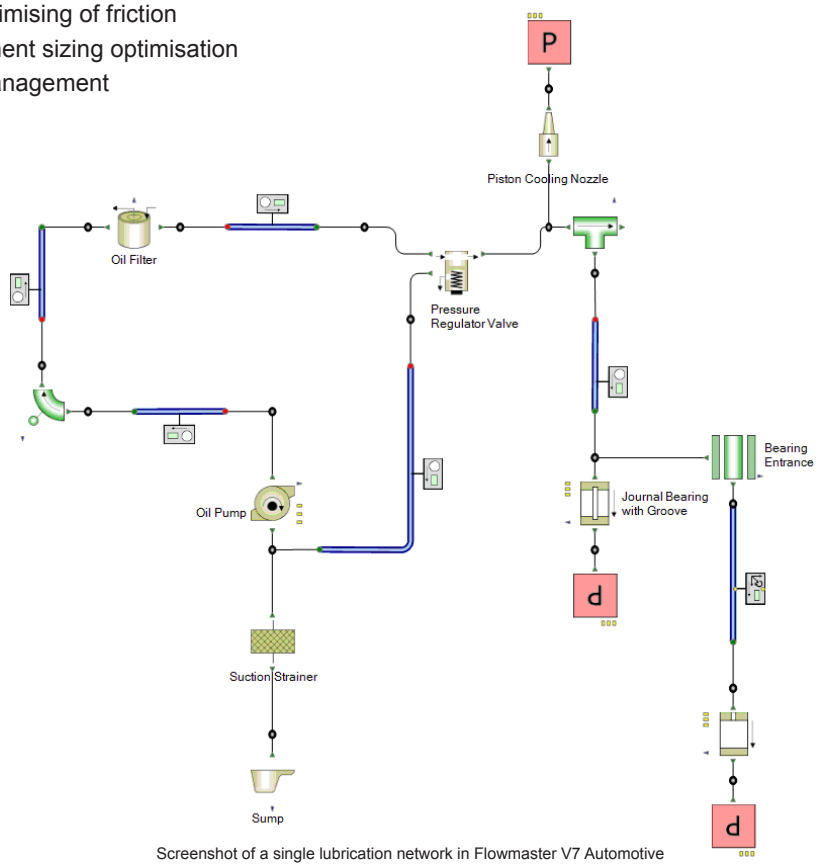
Lubrication Systems Modelling

With energy prices rising and both markets and legislation demanding more efficient engines, optimising the lubrication systems of your powertrain systems is essential to ensuring as efficient and economical vehicle operation as possible.

Flowmaster V7 Automotive has been designed to provide users with dedicated automotive software packages tailored for specific applications, providing enhanced usability, functionality and capabilites.

The Lubrication Systems Modelling packages from Flowmaster enable Automotive Systems Engineers to understand the complex dynamics of an entire lubrication system allowing you to quickly and easily evaluate your lubrication design, to ensure:

- Adequate oil flow to all components, such as bearings, for all operating conditions
- The minimising of friction
- Component sizing optimisation
- Heat management

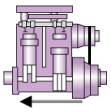


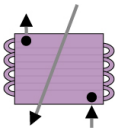
Screenshot of a single lubrication network in Flowmaster V7 Automotive

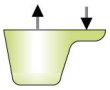
Flowmaster
Fluid thinking for systems engineers

www.flowmaster.com

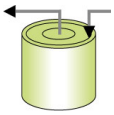
Lubrication System Components:

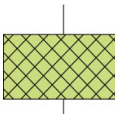

Engine


Oil Cooler

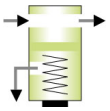

Closed System Sump


Lube Jet


Oil Filter


Oil Pump Strainer


Open System Sump


Pressure Regulator


CAM Phaser

Volume

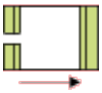
Flowmaster V7 Automotive Lubrication Packages enable you to build models of entire engine and transmission lubrication systems taking into account all the main consumers of oil, e.g. oil pumps, pressure limiting and regulating valves, oil passage ways, bearings, hydraulic lash adjusters, camshaft variable timing devices, chain and belt tensioners and sumps (oil pans).

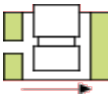
Standard components that enable you to create your own custom components include:

- Crankshaft drillings, including inertia effects
- T junctions and bends
- Heat exchangers
- Standard and user definable oils
- Journal bearing components that can accommodate direct input from specialised bearing simulation codes, taking into account geometrical effects
- Positive displacement oil pumps
- Orifices
- Pipes
- Relief valves
- Hydraulic CAM Phaser

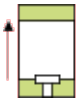
Bearing Components:

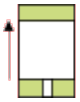

Bearing Entrance Loss

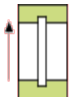

Generic Bearing


Hydraulic Valve Clearance


Radial Sliding Bearing with Special Oil Pocket


Radial Sliding Bearing with Pocket


Radial Sliding Bearing with Bore


Radial Sliding Bearing with Groove


Crosshead Bearing

Once constructed, these models can be run under various conditions to simulate steady or transient conditions. This enables you to predict accurately lubricant pressure, flow rates, temperatures and other performance parameters as well as optimise component sizes and understand the effect of component changes on the entire system. By linking your lubrication model and a Flowmaster cooling model for example, the effects of the lubrication system on the engine cooling system can be assessed for scenarios such as warm-up or standard industry drive cycles.

Flowmaster V7 Automotive provides an enjoyable user experience, allowing you to quickly and efficiently build networks and to communicate with non-Flowmaster users easily. Featuring validated data entry and an advanced graphical user interface, margin for error is reduced, optimising accuracy of results first time.

Unique database capabilities mean all data for components, systems and results can be stored and accessed easily. Co-simulation via COM, MpCCI and XML allows Flowmaster V7 Automotive to contribute to the entire development process. Its sophisticated Simulation Data Management Tool provides an audit trail which enables users to manage parameters and run “what-if” scenarios at the concept stage. Specific industry help and tutorials are available within the software making integration easier and faster.