Cooling Systems Modelling

Thermal Management is a significant challenge in the design of modern vehicles and a well-designed cooling system is vital in overcoming this challenge. Designing and optimising for packaging space restrictions, powertrain architecture variations and thermal loads is essential.

The Cooling Systems Modelling packages from Flowmaster enable you to model your cooling system and optimise its design before building the real thing, whether you vary the design parameters of the thermostat to ensure a constant temperature in the cooling system or resize key components to packaging constraints.

Modelling Cooling systems in Flowmaster can allow you to evaluate the following:

- The impact of components for different suppliers on the overall cooling system
- The effects of different operating conditions; warm-up cycles in winter
- The sizing of the expansion tank or de-gas bottle and its effects on performance

Features

- Model heat transfer effects for both Steady State and Transient flow conditions using a wide range of heat transfer options
- Examine system pressures, flow rates and temperatures
- Model with a wide range of standard and cooling specific components
- Learn with cooling specific tutorials and help
- Co-simulate with other industry tools such as ANSYS Fluent, STAR-CD and MATLAB®/Simulink®

Benefits

- Design and optimise cooling systems to underhood sizing and packaging constraints
- Investigate if coolant temperature oscillations occur and whether they affect passenger comfort or engine emissions
- Accelerate your validation process by simply importing test data directly into the cooling system model

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Engine heat rejection and its control are critical to engine performance and vehicle emissions. When you model an engine cooling system in Flowmaster V7 Automotive, you can easily determine:

- Heat rejection based on engine speed and load
- The thermal flow paths between the engines metal structure with the coolant and underhood air flow
- That the rate of heat transfer is realistic

To help you do all of this Flowmaster V7 Automotive Cooling Systems packages comes complete with a wide range of standard and cooling specific components, including:

- Engine components including thermal inertia, conduction, convection & radiation
- Fans, Pumps & Valves
- Pipes & expandable hoses
- Heat Exchangers
- Standard & User Definable Coolants

Once constructed, these models can be run under various conditions to simulate steady or transient conditions. This enables you to accurately predict coolant 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 coolant model and a Flowmaster lubrication model, the effects of the engine cooling system on the lubrication system, during scenarios such as warm-up or standard industry drive cycles, can be assessed.

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.