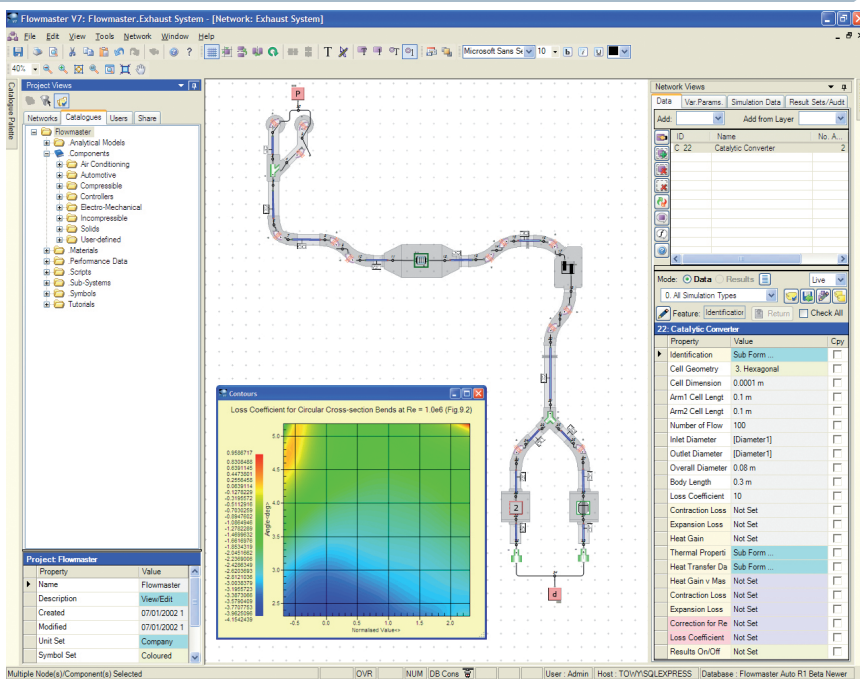


SYSTEM SIMULATION

A new simulation package can assist engineers when dealing with complex flow and thermal effects analysis



Screen shot of Flowmaster Version 7 simulation package being applied to the development of an exhaust system

Flow networks in automotive systems are made up of a multitude of assemblies, sub-assemblies and individual components. These elements are subject to a series of extremely complex inter-relationships and dependencies. Such systems are growing in complexity and cost, but the times and budgets to deliver them often go in the opposite direction. As a result, companies are turning to CFD to satisfy these growing and very sophisticated demands. Engineers can use CFD to model, analyze and test the flow mechanics and thermal behavior of their systems at an early design stage. They can define variations and test them virtually, reducing the number of prototypes needed.

In principal, there are two approaches to CFD. The first of these is 3D CFD simulation, whose color images are familiar to a wide audience. The 3D CFD programs are able to make extremely detailed statements as to flow, mechanical and thermal conditions in or on a particular component part/assembly. As impressive as the possibilities and results might be, they are built on extensive CAD models and require huge a lot of computing power to calculate. As a result, single runs of several

hours are not uncommon. This effectively puts them outside the realms of possibility and practicality when complex systems with numerous assembly parts have to be simulated. The real strength of 3D simulation lies in the highly detailed analysis of individual components or of systems of a manageable size.

The second type of simulation is that of 1D or system simulation, which is based on numerical-empirical approaches. This uses schematic models of the flow systems in which each individual component's behavior is either defined by an underlying physical formula or by pre-determined characteristic diagrams. The parameters for these can be provided by the component manufacturer or determined through the engineering company's own tests. The advantage of this approach is its independence from CAD-data, with the resulting speed and ease with which even complex networks can be modeled and the simulation run. Processing time is often no more than a few minutes. This speed makes it possible to use the technology at a very early stage in the development process to design complex systems, as well as allowing

engineers to consider 'what if' scenarios and to test variations.

Flowmaster Group is a leading global provider of system simulation software and has recently launched the next generation in its portfolio – Flowmaster Version 7 – that has been designed for analysts' and design engineers' desktops.

Version 7 provides a comprehensive suite of tools for the simulation of complex internal flow and thermal systems. Both steady state and transient, compressible and incompressible are possible. The software calculates temperature, pressure, volume and mass flows for each component and every node across the defined system. In addition, Version 7 is built upon a flexible architecture allowing rapid development to customer needs. A relational database underpins the whole product that manages users, components, networks and results, and allows engineers to link into PLM systems for enterprise-wide collaboration.

Version 7 is easy to use, built around the Windows platform and developed using real-world workflows, allowing engineers to get up to speed and generate extensive flow system models quickly. Required components can be selected and inserted from over 20 standard component libraries using simple drag and drop commands. Integrated knowledge rules mean that as the engineer builds a model, the state of the model is continuously checked to ensure that only valid components are connected to one another and realistic parameters are entered. This saves time and minimizes any manual checking of the model.

The Version 7 product is a platform for industry versions of Flowmaster, and the first – Version 7 Automotive Release 1 – is soon to be launched. Automotive Release 1 is groundbreaking in its design, not only carrying over all the industry leading capabilities of the core product, but tailored for the auto engineer. Numerous packages are offered, covering all disciplines, such as cooling, exhaust and fuel injection and total vehicle thermal management. **ETI**

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