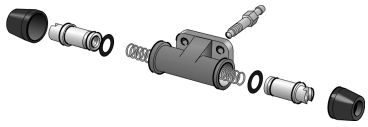
GM General Motors

GM Delphi Uses VisSim to Reduce Brake Control System Prototyping Time

Gary Fulks, senior design engineer at GM Delphi describes his use of VisSim and VisSim/Real-Time to Peter Darnell, president of Visual Solution



In the past, it took up to two months of special machine shop work, circuit design, hand-coded software development and in-car testing to determine whether a design was feasible for production. Now, with the combination of fast and powerful block diagram-based modeling and simulation software from Visual Solutions and highly reliable, noise-immune data acquisition cards from National Instruments, such testing can be done in two days or less.

GM Delphi configured a system of VisSim running on a lap top with two PCMCIA DAC Card 1200s, 16 analog inputs, 4 analog outputs and16 digital I/Os. With their complex control system, they achieved closed-loop sampling rates of over 200 Hz running a 100 MHz Pentium laptop. VisSim/Real-Time is capable of closed-loop sampling rates of up to 5000 Hz depending upon the complexity of the closed-loop system and the CPU speed.

A typical use of this setup is to test out electronic braking assist equipment. Both the closed-loop control as well as data logging can easily be developed and configured with VisSim. Once the sensors and equipment under test are installed in the vehicle, it is a simple matter to mount the laptop in the passengers seat, secured with a standard 2" nylon web tie-down, then plug in the ribbon cables to the DAQ Card 1200s, and turn on the laptop. Because it is difficult to view the laptop display during daylight driving, an LED display panel, driven by the digital I/O of the DAQ Card, is used for critical function monitoring. Five-minute runs with strip charts tracking user inputs, pedal pressures, accelerations, controller outputs are typical.

In over a year of use, VisSim has never failed during a real-time run. The system has proven robust under the harsh demands of vigorous brake testing, lack of good electrical ground, wide temperature and humidity variations common to Ohio, and general garage lab treatment.

We also use VisSim in lab bench situations such as automated performance testing of hydraulic valves. Using map blocks, it is easy to create time-based test sequences and correlate sensor outputs with command inputs. The wide array of plotting capability and data export makes it easy for data analysis. We feel that VisSim has been an important addition to the set of tools we use in automotive design and test.

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