

## FORD'S INDUSTRY-FIRST TECHNOLOGY SPEEDS INTERIOR DESIGN

By John Fossen, FCN



Ford Motor Company has developed a system for flexible vehicle packaging that saves money and shortens the time it takes to bring interior designs to market. Called hardware-in-the-loop (HIL), it reduces the need for physical prototypes which are expensive and time-consuming to build.

"We have directly connected a physical Programmable Vehicle Model, or PVM, to a computer-generated virtual PVM, enabling true bi-directional communication -- a first in the industry," said Charles Wu, director, Manufacturing and Vehicle Design, Ford Research & Advanced Engineering.

The unique Ford system allows users to move large surfaces around in either PVM, such as the instrument panel, roof and door panels. The changes then can be transferred instantly between the PVMs.

"This technology allows senior management and program teams to quickly assess design impact on packaging and vice versa, compare our vehicle packages against those of competitors, and make real-time design changes and program decisions all in one integrated environment," said Gary Strumolo, manager, Vehicle Design, Ford Research and Advanced Engineering.

Already used or in use on more than eight North American vehicle programs, Ford's new HIL system has saved hundreds of thousands of dollars per program by eliminating two seating bucks -- physical properties -- in the product development process and reduced the build time for another buck by seven weeks.

Although the automotive industry continues to migrate to more computer-based design, engineering and testing, which reduce costs and compress time to market, certain aspects of vehicle development still require the time-consuming construction of expensive physical prototypes.

"The main purpose of the system is to provide for improved interior design appraisals early in vehicle programs, which will allow teams to make better decisions that will benefit our customers," said Nancy Wang, technical leader, Vehicle Design, Ford Research and Advanced Engineering. "On one program, six alternative proposals were evaluated using the HIL system."

Gary Boes, Ford chief nameplate engineer, used the technology on a future vehicle program and highly recommends it as

a valuable development tool.

"Our team used it to set initial interior packaging targets and to confirm them," said Boes. "For example, is the headroom sufficient? Is there enough distance between the first- and second-row seats? We also attached clay models of our door trim panels and instrument panel on the buck. You could see where the armrest is and begin to get a feel for the reach zones. It helps you save time and gives you confidence in your designs."

The new HIL system can accommodate all Ford Motor Company vehicles and competitive products from small cars up to full-size pickups. The technology has been integrated into Ford's Global Product Development System and currently has two patents pending.