

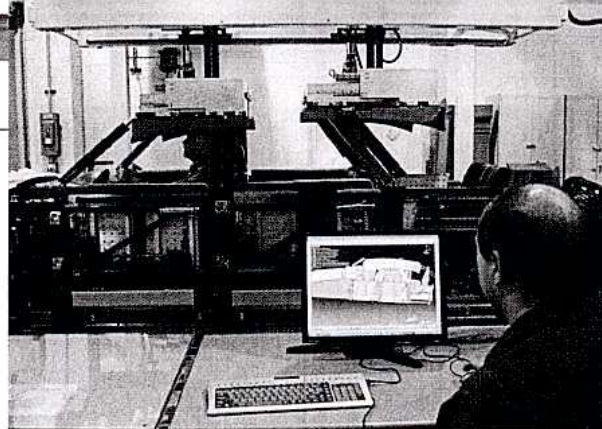
While the PVM provides the foundation to the package design process transformation, the HIL system bridges the world of physical parts to the virtual space of computer models and establishes real-time communication to eliminate the disconnect and waiting time needed for buck rework and design changes in the conventional package design/appraisal process.

With the conventional process, the iteration level of physical parts and that of design are often out of sync – more change requests have been made to the design by the time the previous packaging buck is ready for use because the construction normally takes weeks, even months. Additionally, there is no direct feedback from the appraisal to the design – the evaluation results have traditionally been communicated back to the requesting organization either verbally or in a written form followed by new design changes.

Ford's unique HIL system directly connects the PVM with a parametric-driven, fully automated CAD-based Virtual PVM (VPVM) for rapid vehicle package design and appraisal. The VPVM is a computer-generated representation of the PVM. It accepts program inputs, sets up the armature, and simulates the PVM movements. It takes feedback directly from the PVM review and modifies the design on the computer accordingly. The resulting design model can then be used to fabricate parts for the PVM.

The bi-directional communication between PVM and VPVM is the key enabler to the HIL system integration: the PVM controller "talks" directly with the computer where the VPVM model resides via inter-process protocol (software) and local network connections (hardware).

The industry-first HIL technology revolutionizes the vehicle interior design and appraisal process, and already has had a significant impact on Ford's products and processes. Used or in use on many North American vehicle programs, the HIL system has saved hundreds of thousands of dollars per program by eliminating early seating bucks in the product



In the HIL System, an engineer operates the VPVM (foreground) and controls the movement of PVM (background), another engineer inside the PVM conducting package appraisals

development process and by reducing the build time for another buck by weeks. The technology has been integrated into Ford's Global Product Development System and currently has two patents pending.

"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 new system." Adds Gary Strumolo, manager, Vehicle Design, Ford Research and Advanced Engineering, "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."

Boes and his team have used the technology on a future vehicle program, and highly recommend it as a valuable development tool. "A clear benefit of this new technology is that it truly provides the engineer with an objective point of view," said Boes. "We can literally step inside a mechanical device that simulates a new vehicle design and make sure the design fits the needs of Ford drivers." ♦

Gary Boes

Chief Nameplate Engineer

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