Success Story

Volvo Cars Selects SGI™ Origin™ 3800 Supercomputer for Crash Simulations

Volvo Cars's overall objective is that every new Volvo model should be safer than previous ones. In line with the safety strategy, Volvo Cars's department of development in Gothenburg, Sweden, has invested in an SGI Origin 3800 server with 128 CPUs. SGI was chosen as a system supplier after evaluation at Ford in the U.S. SGI's improvement of the performance of Volvo's crash application software RADIOSS also played a major role.

The new server is used when crash simulations are conducted as part of the development of safer cars. With the SGI Origin 3800 system, crash simulations can now be done more thoroughly because of an increased computing performance of more than 30%.

"The extra computing performance delivered by SGI Origin 3800 will give us the opportunity to strengthen our advanced safety center in Gothenburg and helps us guarantee that the end product, the cars, will be dependably safe," says Anders Broo, project manager at Volvo Car Corporation. "Our investment in a new SGI server helps us achieve our long-term strategy to maintain the leading position in crash simulation and safety. Our safety strategy includes two areas: high-performance computing in an early phase of the development of a new car model and real-life testing at a later stage."

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—Anders Broo, Project Manager
Volvo Car Corporation

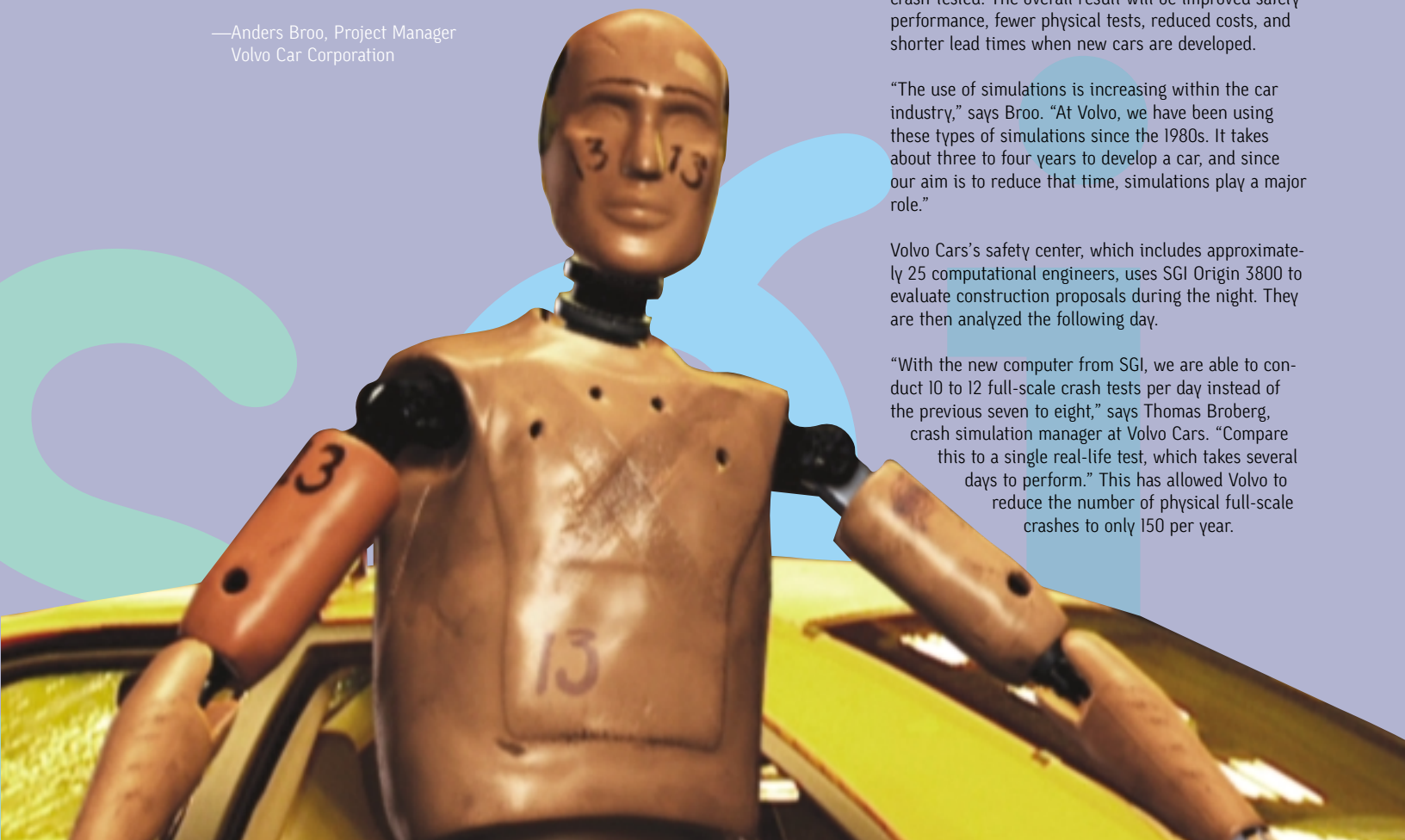
Simulations Improve the Cars and Reduce Costs

The main purpose of simulation is to test new designs at an early stage in the development process—before they actually exist as prototypes and before they are crash-tested. The overall result will be improved safety performance, fewer physical tests, reduced costs, and shorter lead times when new cars are developed.

"The use of simulations is increasing within the car industry," says Broo. "At Volvo, we have been using these types of simulations since the 1980s. It takes about three to four years to develop a car, and since our aim is to reduce that time, simulations play a major role."

Volvo Cars's safety center, which includes approximately 25 computational engineers, uses SGI Origin 3800 to evaluate construction proposals during the night. They are then analyzed the following day.

"With the new computer from SGI, we are able to conduct 10 to 12 full-scale crash tests per day instead of the previous seven to eight," says Thomas Broberg, crash simulation manager at Volvo Cars. "Compare this to a single real-life test, which takes several days to perform." This has allowed Volvo to reduce the number of physical full-scale crashes to only 150 per year.



Design and Safety

Real-life accidents and the behavior of Volvo cars on the road are the starting point for the safety work. More than 28,000 accidents with more than 40,000 occupants have been investigated since 1970. The collected accident data is used to develop internal test methods aiming to reproduce the real-life situation.

The work involved in developing a new model includes continuous crash tests and mathematical simulations to check that systems and designs comply with the requirements. At each stage of the development, Volvo strives to develop components, systems, and, in the end, complete structures that comply with the set requirements. This is achieved by means of intimate collaboration between designers and safety experts.

The World's Most Advanced Facility

Volvo's new ultramodern vehicle safety center, VSC 2000 in Gothenburg, Sweden, opened last year and is now the world's most advanced facility of its type. The center enables Volvo to consolidate its position as one of the world leaders in the field of car safety.

The new building, which includes crash tracks for full-scale tests, lets Volvo conduct tests involving virtually every type of accident, including car-to-car frontal collisions, side impacts, roll-overs, and collisions with objects in the environment surrounding traffic.

Volvo's commitment to safety also includes new equipment that offers opportunities to test new designs in a computer environment. This is a cost-effective way of rapidly evaluating new technical systems.

"People who buy a Volvo expect to get one of the safest cars in the world," says Broberg. "Increased computer capacity for crash simulations in combination with a new vehicle safety center will enable us to reduce development times in our projects and develop more and safer cars in the same amount of time."

Specially Adapted Code

SGI was chosen as a system supplier after evaluation in the U.S., where criteria were set for price, performance, and application expertise.

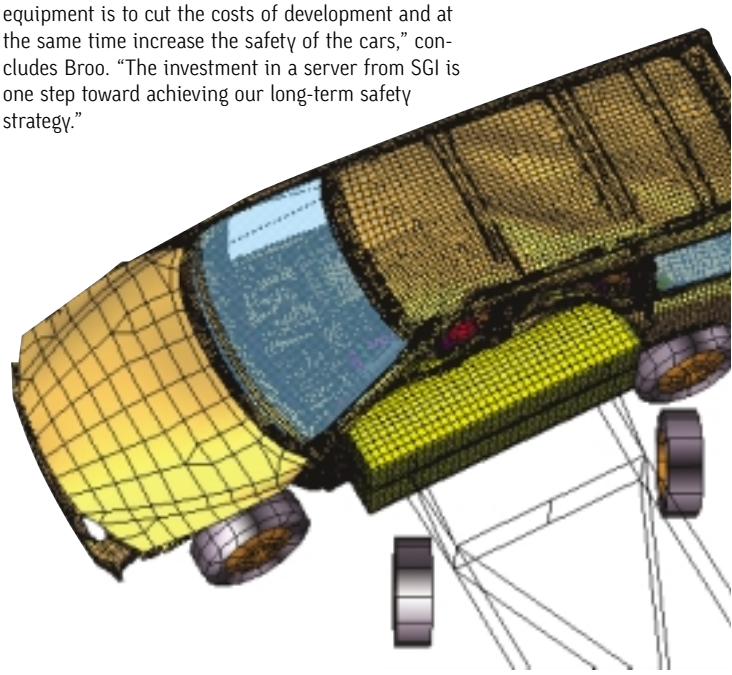
"In order to further develop our safety strategy, we needed more computing capacity," says Broo. "We could have chosen to add on to our existing system, but that would have been more expensive. RISC-based machines are cheaper since the components are standardized. The implementation of SGI Origin 3800, for which SGI was partly responsible, has gone very smoothly."

Volvo is using RADIOSS software from Mecalog on SGI Origin 3800 for crash simulation. The distributed memory parallel version RADIOSS SPMD was tuned for RISC-based systems by SGI and is significantly faster than on vector-based systems at much lower costs. This marks one of the first times that this version of RADIOSS is being used for crash simulations in car development projects.

Around-the-Clock Service

The investment in SGI Origin 3800 was financed through Solutions Finance at SGI, which means a flexible and upgradable finance solution. Volvo has also signed a FullExpress service contract with SGI. This guarantees that a technician will be in place no later than four hours after a service call and that spare parts are easily available and free.

"The driving force for investing in new technical equipment is to cut the costs of development and at the same time increase the safety of the cars," concludes Broo. "The investment in a server from SGI is one step toward achieving our long-term safety strategy."



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