

New research program
studies simulation, modeling
and decision science

SimCity



Software developed by researchers in the new Simulation, Modeling and Decision Science program allows users to enter a virtual environment that displays velocity information from a data set about the birth of a star.

BY BREEHAN GERLEMAN

ENGINEERS CAN LOOK INSIDE A POWER PLANT, adjust a row of processors and quickly see the results all with a few mouse clicks using virtual engineering tools developed by researchers at Ames Laboratory. Such tools are among software programs developed by the new Ames Lab Simulation, Modeling and Decision Science program designed to help engineers make faster and better design decisions.

Simulation, modeling and decision science researchers create computer applications that convert large 3-D data sets into virtual models that perform just like real-world versions. Engineers view and interact with the models on their computer screens or in a virtual-reality room.

"Simulation, modeling and decision science brings together all the pieces of engineering data, and engineers can actually see what they are doing," says Mark Bryden, Ames Laboratory scientist and Iowa State University associate professor of mechanical engineering, who directs the new program. "They can take a close look at a fan in a virtual engine, make a change to the fan, and then immediately see what happens to the engine's heat-removal capability in the virtual environment."

Trying out engineering plans in the virtual realm leads to sound problem-solving and design in reality.

"We are interested in how engineers can deal with uncertainty in design, and how we can help engineers make good decisions," Bryden says.

Bryden and his team have been studying simulation, modeling and decision science at Ames Lab for several

years, and the virtual engineering tools are already in use in DOE projects. Researchers are developing software to model FutureGen, an experimental power plant planned to be the first coal-fueled, near-zero-emissions plant in the world. They also are using the software for turbine- and sensor-modeling research.

Virtual engineering research did not fit into any existing Ames Lab scientific program, so Lab management created the new Simulation, Modeling and Decision Science program. Bryden's work on TBET, a texture-based virtual engineering tool, won an R&D 100 Award in 2006, and the simulation, modeling and decision science field is growing rapidly.

"We have the only virtual engineering software available right now. We want to continue to be leaders in the field and leaders in enabling change in engineering," Bryden says.

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