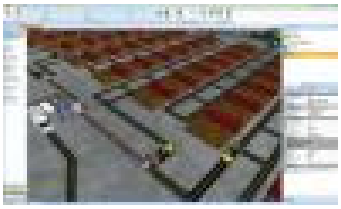
Process Simulations Get a Boost from Object-Oriented Software

Machine Design Software Review: http://machinedesign.com/article/process-simulations-get-a-boost-from-object-oriented-software-0818

AUGUST 18, 2009 **Leslie Gordon**



Simio software lets users build simulation models of complex real-world systems. Such systems are found in a variety of fields including manufacturing, supply chain, logistics, health care, pharmaceuticals, and assembly and packaging.

Marcus Volz
Analyst
TSG Consulting
Melbourne, Australia
marcus.volz@tsgconsulting.com.au

Resources:
TSG Consulting, +613 9607 6125, *www.tsgconsulting.com.au*

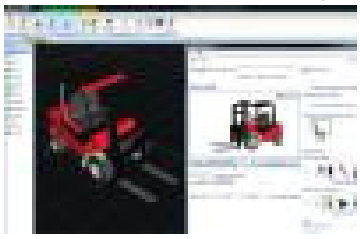
TSG Consulting is a technical consulting firm that specializes in quantitative decision analysis of complex mining, manufacturing, logistical, and transportation systems.

Edited by **Leslie Gordon**
leslie.gordon@penton.com

Many simulation packages are available. But most use an underlying modeling framework known as the "process orientation," in which a system is described by the movement of entities through a process flow. The resulting models look like flowcharts, and additional coding is usually necessary to animate models so they resemble the real system.

In contrast, Simio provides an "object-oriented" approach in which the system is described by "intelligent objects" that represent physical components such as machines, forklifts, and conveyors. The interaction of these objects is what reveals system behavior. Models resemble the real system, since an object's logic and animation are jointly generated.

To create a new model in Simio, users first place objects in the facility view window and define their appearance and properties. There are a series of views associated with each object class in a model. For example, users code the process logic which defines the object's underlying behavior in a process view. The dashboard view lets users create displays for monitoring an object's status during a simulation run, while data is created and edited in the data view window. Users define properties, states, and events in the interface view, and define the external representation of an object in its external view. An experiment view lets users define and execute a series of simulation-run scenarios, while the results view shows results and reports.



Recently, we developed a 3D model of a warehouse facility in the software. The system includes two conveyors that carry packages into the warehouse. Forklifts pick up the packages and place them into designated storage bunkers from which they are retrieved by other forklifts and placed onto outloading conveyors. An overhead gantry crane lifts batched package units and loads them onto trucks. The purpose of the simulation model was to analyze system performance during high-demand periods and identify bottlenecks.

We modeled the packages using the default entity object, and the forklifts, crane, and trucks using vehicle objects from the software's standard library. Each object was instantiated by dragging it into the facility view, where its appearance was customized by selecting an appropriate symbol from the symbols tab or from Google 3D Warehouse.

Next, we created a user-defined class of bunker objects to represent the storage areas with the server object from the standard library as its basis. However, we extended the object's function and modified its appearance. Finally, we constructed a network of node and path objects connecting the bunkers to the inloading and outloading streams modeled by conveyor objects.

A major draw card of Simio is its 3D animation. Also, users can toggle between 2D and 3D views, change object locations, and add new paths — all while a simulation is running. Objects can even change their appearance during a run based on their state.

The software has an efficient structure and an intuitive design. While some may view the need to constantly move between different windows a burden, I found this arrangement a logical and efficient way to package, organize, and access model components. Moreover, the capability to use multiple split-screen windows is helpful.

The first official release of the software had a few minor drawbacks. There were plenty of helpful resources including example projects, video tutorials, pop-up information, and an online forum, but the software lacked a detailed user manual consolidating this information. The few graphics and stability issues are being resolved with each new release. Experiments took us longer than expected to run. However, it should be noted that our model was not constructed with efficiency in mind. Debugging was not an issue, but it would be good to see more advanced debugging tools in future versions.

Overall, Simio is a user-friendly and effective package for quickly building simulation models with impressive 3D animation. This is evidenced by our building of a functional and fully-animated version of the warehouse model in only three days, using a beta version with little available documentation. Simio is a distinctive simulation product that convincingly promotes the paradigm shift from process to object orientation.

The software comes from **Simio LLC**, 504 Beaver St., Sewickley, PA 15143, (877) 297- 4646, *www.simio.biz*.