

Simlog ingenuity and Vortex physics make simulations real

Canada is the world's largest exporter of forestry related products, resulting in an industry worth representing an industry worth \$44 billion. In this business, reliable operations are essential to the growth and maintenance of this industry, at all phases of production. This means efficient handling of the machinery used for logging is critical. The vehicles used are complex pieces of equipment that require extensive operator training to ensure proper use and to gain the biggest return on equipment investment. Here's where Simlog comes in; they are a Montreal-based company that develops interactive training simulators for the forestry, mining and construction industries. They understand the need for accurate training and have developed simulators for a variety of equipment including the log forwarder.

A log forwarder is a machine that gathers logs after they have been cut and de-limbed, and brings them to the roadside where they will later be loaded onto trucks for transportation. They are expensive and can cost up to half a million dollars each. An operator must be able to grapple several logs at one time, sometimes swing them up on one end and tap them on the ground to align them, and then drive them to the edge of the road and pile for later pickup. This is no easy task and requires mechanical aptitude and coordination as well as an intuitive understanding of the way the logs interact with each other, the machine and the surrounding terrain.

Highly skilled operators are an essential ingredient to achieving maximum efficiency in daily operations and the greatest return on investment for the equipment itself. This means that allocating equipment for training is not economically viable; typically a mill keeps their fleet in production around the clock, removing them only for maintenance. Most workers in the logging industry develop their skills on-the-job, where a novice operator is paired with a more experienced colleague and practices in the field. Although this practice is effective, damage to a machine is unavoidable. Trainees often hit the log grapple part of the machine as they develop the dexterity required for smooth mechanical operation and the cost of repairing the machines – and the downtime – is high. Not to mention that some workers simply lack the required skills needed to effectively handle the vehicle and should be screened out even before getting to the forest.

As a result, sawmills and contractors are now turning to simulators that replicate the forest setting and equipment controls used to maneuver the log grapple. A trainee benefits from direct hands on experience in a classroom setting, not in the forest. This lets the trainees master the skills and dexterity required to operate the controls of the equipment so that once they make the transition to the workplace they are well equipped to start production. In addition, students who don't have the aptitude to maneuver the vehicle are never placed in the field, thereby preventing unnecessary equipment damage and keeping the machines working in the field.

Simlog has an extensive background in developing virtual training solutions for the Canadian forestry industry. Several of their simulators are already being used in schools across the country. They knew that for a successful log forwarder simulator, not only would they have to develop a system that included real-time graphics and visualization, they would also need to create scenarios that demonstrated the range of natural behaviors an operator would experience in the forest. Simlog wanted to incorporate physics to simulate the real-world motion and interaction of the objects in the forest and provide students with the best learning experience, outside of an actual vehicle.



What they needed was a tool that could handle the contact generation and dynamics within the scene so that they wouldn't have to anticipate the range of behavior an operator might encounter. "In a logging simulation, the log piles are inherently chaotic systems," explains Paul MacKenzie, Vice-president, Product Development at Simlog, "We were looking for a solution that could handle all the possible interactions without us having to explicitly plan them, and one that could change on the fly depending on a specific action of the operator". In addition, they needed a physics API that could be used within their existing development environment. After some research, they concluded that Vortex met their criteria.

Vortex, a 3D physics modeling SDK, delivered the functionality Simlog needed. It allows users to establish parameters such as mass, size, inertia and friction, defining where the geometries are, then the simulator renders the movement of the graphical models. The toolkit also provided the stability MacKenzie was looking for. Furthermore, he was impressed by the low level of computational effort it exhibited in simulating the physics within the scene. Vortex was integrated at the outset of the development phase. Simlog was using WorldToolKit from Sense8 for the rendering and discovered that it was a straightforward task to integrate the Vortex API. "Because the two libraries fit so well together, we did not have to change our rendering infrastructure just to incorporate a new dynamics library," says MacKenzie.

When simulating accurate physics, many variables need to be configured to make the simulation run smoothly. When Simlog needed assistance, they turned to the CMLabs support team. "The value of good customer support cannot be overstated," states MacKenzie. "(CMLabs) has a valuable work ethic and they were always responsive when we had questions. They can be trusted to solve problems."

Simlog is already planning to incorporate Vortex in future simulators, "Vortex is a great piece of software engineering and can add so much to our simulator products. We see what we can accomplish with Vortex, and look forward to using it in other simulators."



*"Vortex is a great piece of software engineering."
Paul MacKenzie, Vice-President,
Product Development at Simlog.*

Vortex product advantages

- COTS software
- Easy to use
- Stable physics with strong performance
- Excellent customer support

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