

Something New: Personal Training Simulators for the Professional Logging Contractor

PAUL FREEDMAN

Simlog (www.simlog.com)

440, René-Lévesque West, Suite 1210

Montréal, Québec H2Z 1V7

ABSTRACT -- Modern mechanized harvesting equipment is increasingly complex, costly, and difficult to operate productively. In addition, industry stakeholders and the general public are demanding better forestry practices. To address the associated operator training challenges, various “turnkey” (hardware-software) harvester simulators are now available. However, most logging in Canada is conducted by small, independent contractors and these turnkey simulators continue to be too complex and much too costly for them. In this article, we describe a new family of training products from Simlog called Personal Simulators, designed just for the professional logging contractor, consisting of two PC joysticks and simulation software to be installed on the contractor’s own Personal Computer.

INTRODUCTION

Modern mechanized harvesting equipment is increasingly complex, costly, and difficult to operate productively. In addition, industry stakeholders and the general public are demanding better forestry practices. Job quality, not just job productivity, is thus increasingly important. Moreover, operator re-training and cross-training pose additional operator training challenges, along with operator certification (set to begin in Ontario in January 2002).

In a previous article [Freedman 1998], we described the growing popularity of Cut-To-Length (CTL) mechanized harvesting, and the associated operator training challenges which are particularly acute for harvester/processor operators. In a follow-up article [Freedman 1999], we described and compared various “turnkey” (hardware-software) harvester simulators available from equipment manufacturers such as Timberjack (John Deere) and Valmet (Partek Forest). Since that time, additional harvester simulators have become available from Ponsse and Caterpillar. Of course, these simulators are *primarily* intended to promote new equipment sales and as a result, they all have many manufacturer-specific features.

However, most logging in Canada is conducted by small, independent contractors (80%, according to some estimates) and these simulators continue to be too complex and much too costly for them. In general, the simulator complexity has two sources:

- the hardware elements taken from real machines, such as operator controls, operator chair, and on-board computer (measurement system)
- the sophistication of the modeling and simulation itself, requiring special graphics workstations or

several networked PCs, multiple displays, etc.

Moreover, simulator set-up can be difficult, and the simulators are not readily portable (unless mounted in a trailer for towing by another vehicle). Of course, all this complexity is reflected in the high purchase prices.

However, modern PCs are finally offering the computing horsepower and graphics capabilities required for real-time 3D applications. Thus, the stage is now set for bringing the power of training simulation within reach of the professional logging contractor in the form of simulation software to be installed on the contractor’s own PC. In this article, we describe such a new kind of product designed by Simlog for just this purpose.

SIMLOG’S TECHNOLOGY

Simlog is a private, independent, Canadian company founded to commercialize award-winning training simulation technology developed at C.R.I.M. (www.crim.ca), one of Canada’s leading research institutes in information technologies. Since 1999, Simlog’s Harvester Operator Training Simulator has been used to help train hundreds of new operators for careers in mechanized harvesting at leading forestry schools and forestry companies in Canada. In particular, Simlog’s technology is helping to reduce training costs and increase harvesting productivity by helping trainers:

- better select training candidates
- better prepare new operators for subsequent training in the woods at the controls of real equipment

A study conducted by Bruce Yates, Training Coordinator at Corner Brook Pulp and Paper, recently confirmed the training effectiveness of Simlog's technology [Yates 2000]. First, the abilities of 42 employees (training candidates) were evaluated. Then, on the basis of a half-day's results (per person) on the simulator, just 35 continued with the simulator-based training (for a total of one week of training, per person). Later, Yates discovered that the amount of wood harvested by this group of new operators was almost 50% greater than that of previous groups of operators who were trained without simulator-based help. Yates also estimated that the cost savings due to pre-screening at almost \$200,000, i.e. the costs of not training 7 employees who would never have gained sufficient proficiency in the woods to become competent harvester operators. Additional information about Yates' study can be found in [Fullerton 2001].

The importance of selecting training candidates wisely cannot be overstated. Anecdotal evidence and our own studies show that up to 30% of trainees never become truly proficient. Human factors research [Fleishman and Reilly 1992] suggest that there are three kinds of human abilities needed:

- several "psycho-motor" abilities associated with manual dexterity (moving arms/hands and many fingers at the same time)
- a "sensory/perceptual" ability associated with depth perception
- a "cognitive" ability associated with spatial orientation

All three skills are important, but until now, it's been difficult to evaluate them properly. As a result, trainers have continued to rely on observing trainees at work at the controls of real machines, with all of the associated costs and potential danger.

But what about training help from the turnkey simulators now available? In practice, they have changed the training dynamic only slightly for logging contractors. Firstly, there are few schools in Canada with forestry equipment operator training programs and even fewer ones equipped

with simulators. As a result, for most logging contractors, there are simply no local graduates to hire. Secondly, even when schools are "nearby", the costs of sending new hires to school are often prohibitive, due to the tuition fees and duration of the training programs. As for the equipment manufacturers, just a handful of dealers are equipped with simulators and even then, the emphasis is on promoting new equipment sales instead of simulator-based operator training. Finally, since most contractors are training just 1-2 new operators at any time e.g. when new equipment is purchased to expand logging activities (instead of replacing older machines) or when an experienced operator retires or moves away, the available turnkey simulators are too complex and much too costly for contractors to purchase. For all of these reasons, most contractors continue to train their own operators and do so without any simulator-based help.

Of course, the contractors' training difficulties have many operational consequences, as made clear by the following quotation from a leading Canadian CTL equipment distributor:

"From our perspective, we continually see the issue of operator availability. It is perhaps the most pervasive and critical problem facing new as well as experienced CTL contractors today. We see a huge range in operator productivity and machine repair costs. This is a problem that is not going to disappear and must be addressed on an ongoing basis by proper operator training. I suspect that many owner-operators are struggling on a daily basis to solve this problem." [Anderson 2001]

PERSONAL HARVESTER SIMULATOR DEVELOPMENT

To address the particular training needs of professional logging contractors, Simlog created earlier this year (2001) a new family of training products based on its proven simulation technology. Called "Personal Simulators", these units consist of two PC joysticks and simulation software to be installed on the contractor's own PC from Simlog's CD-ROM.



The simulator's training modules leads the trainee, step by step, through the basics of harvester operation. Indeed, it is this incremental introduction to the full complexity of the harvester that makes Simlog's unique technology such an effective training tool. For example, the free-swinging of the dangle head attachment is not simulated until after trainees achieve some measure of boom control.

For each training module, key performance criteria are measured per trial, to evaluate the simulated work e.g. the stump height of each tree felled.

When the simulator-based training session ends, the average, minimum, and maximum values of the performance criteria over all of the trials for that module are displayed in Web page format using the PC's Web browser. In addition, this same data is saved as a special "Results" file on the PC's hard disk, with a date and time identifier. In this way, the trainee and the contractor can evaluate training progress by simply reviewing the contents of different files.

Extensive documentation is provided in the form of user-friendly Web pages, along with sample training data so that trainees can "benchmark" their own results. And to maximize training "transfer", the simulation software makes it possible to reconfigure the PC joystick axes and push-buttons to more closely resemble the operating controls of the contractor's own equipment (for stick in/out, grapple close/open, etc.).

A pre-product version of Simlog's new product was unveiled at the forestry equipment trade show DEMO in September 2000 (Kelowna, B.C.) and then tested in the field from October 2000 to January 2001 by logging contractors in Ontario and Quebec with the support of Tembec Industries and Ontario's Forest Research Partnership. Here's what our liaison at Tembec told us afterwards:

"Most of the Tembec operations are contractor-based and the portable/affordable Personal

Harvester Simulator is important for these small businesses. Simlog's Personal Harvester Simulator is seen as essential for introducing training simulation technology to the independent contractors who supply wood to Tembec. Contractors are interested in using this technology to screen potential operators and train them prior to operating their harvester equipment. In general, we promote the use of this technology to screen and train harvester operators. Simlog's Personal Harvester Simulator is the only practical way that small contractors will have an opportunity to use this technology in an affordable way." [Stinson 2001]

Following the field trials and technology refinements, Simlog's new product was showcased for the first time at the Northeastern Forest Products Expo in April 2001 (Bangor, Maine) and the first unit was sold to a logging contractor in Nova Scotia in June 2001.

Later this year (November 2001), Simlog will be releasing a second Personal Simulator, this time to help train forwarder operators, and a pre-production version will be on display for the first time at LOGFOR in Quebec City (6-8 September, 2001).

The Personal Simulators are available in English and French for Microsoft Windows 98/2000 through Rocan Forest Service (www.rocan.com) and Simlog (www.simlog.com).

CONCLUSION

Operator training for the forest industry will become increasingly important, but conventional "turnkey" (hardware-software) simulators, can't properly address the training needs of the professional logging contractor due to their complexity and cost. Simlog's new family of Personal Simulators are designed to serve just this purpose, and consist of two PC joysticks and simulation software to be installed on the contractor's own PC (from CD-ROM). Simlog's first such product, called the Personal Harvester Simulator, is now available. A second product, Simlog's Personal Forwarder Simulator, will be available later this year (November 2001). Together, they provide for the very first time complete CTL operator training program in a truly cost-effective way.

REFERENCES

Anderson, A. 2001. private communication, Rocan Forestry Service, June 27, 2001.

Fleishman, E. and Reilly, M. 1992. Handbook of Human Abilities: definitions, measurements, and job task descriptions, Consulting Psychologists Press, 1992.

Freedman, P. 1999. *3D Training Simulators for the Forestry Industry*, Canadian Woodlands Forum Annual Meeting, Thunder Bay, Ontario, April 21-22, 1999

Freedman, P. 1998. *Forestry Machine Simulators: looking for added value in training*, Canadian Woodlands Forum Annual Meeting, Montreal, Quebec, March 24-25, 1998.

Fullerton, G. 2001. *The Virtual Harvester: Corner Brook Pulp and Paper uses Simlog software for re-training*, Atlantic Forestry Review, Volume 8, number 1, September 2001.

Stinson, A., 2001. private communication, Tembec Forest Industries, January 24, 2001.

Yates, B. 2000. *High Tech Training of a High Tech Workforce in the Forest Industry*, Canadian Woodlands Forum Annual Meeting, September 13, 2000, Kelowna, B.C.