How the City of Kitchener's Hydraulic Excavator Personal Simulator Saved 240 Man Hours and Produced 500% More Operators

The City of Kitchener is a cosmopolitan community of about 200,000 people located in the heart of south-western Ontario, Canada's largest province.

The city's Operations Division is responsible for the maintenance of roads and sidewalks, sewers and drainage, community trails and parks, and horticulture and tree services. In the winter months, operations also include snow plowing, sanding, and salting, for road maintenance.

To support these operations, the city owns and operates a fleet of heavy equipment including Hydraulic Excavator, Bulldozer, Wheel Loader, and Backhoe Loader (BHL), the municipality's workhorse. There are about 20 BHLs in the city's fleet.

Equipment operators, like other city employees, are unionized and they all receive workplace health and safety training when they are hired.

The Heavy Equipment Operating Challenge

The City of Kitchener, like municipalities everywhere, works hard to provide as many equipment-based services as possible with the current size of their fleet. But like many municipalities, there are often problems having enough qualified equipment operators on staff to put all that equipment to work.

For that reason, the city has an ongoing need to add new equipment operators, whether because additional equipment is purchased or because existing operators retire. Only by having a large enough pool of qualified equipment operators can the city do the most with what it has (and use its citizens' tax dollars as wisely as it can).

Prior to the purchase of Simlog's Hydraulic Excavator Personal Simulator (described later in this article), the city provided no operator training. Instead, applicants were first interviewed and those deemed "qualified" went on to take the city's standardized Practical Exam to test their skills at the controls of a BHL. There were just two possible outcomes, Pass or Fail, with the passing grade leading directly to hiring.

The city's Practical Exam (which can take up to 4 hours to complete) requires students to perform 5

tasks at the controls of a BHL: inspection of equipment, proper trenching around a gas line to expose a water line, lifting sidewalk slabs into a dump truck, digging a swale, and roading of equipment.

The tasks were designed with input from the city's existing operators to ensure that they were applicable to the types of operation carried out by the city, and serve as a good measure of an entry-level operator's ability. Additional details about the Practical Exam are described later in this article in the section Field Training.

As an example, in 2007, twelve city employees replied to a job posting for equipment operator and all twelve received the failing grade.

As a result, the city was obliged to look outside its existing workforce and received more than 300 applications. In the end, just four such external job candidates took the Practical Exam, of which two received the passing grade and were then hired as equipment operators.

Practically, this means the city tested a total of 16 candidates (12 city employees plus 4 external candidates) to identify just 2 suitable hires, a 12.5% success rate (i.e. 2 out of 16) Moreover, the preparation and supervision of the Practical Exam for the

fourteen other people, was a high price to pay.

Making the situation worse, the city was seeing fewer and fewer qualified external job candidates (in 2007, just four qualified people among the 300 applications). To paraphrase one instructor, time was, you could count on hiring young men coming off the farm who would be bringing some mechanical aptitude and some practical experience with operating (farming) equipment. Now, applicants were coming from "donut shops" instead.

Clearly, it was time to change the status quo.

The Creation of In-House Operator Training

The purchase, in 2007, of Simlog's Hydraulic Excavator Personal Simulator and Simlog's Simulation Manager, made it possible for the City of Kitchener to create an in-house operator training program, under the supervision of Jerry Rade, Equipment and Vehicle Training Coordinator.

Jerry Rade, Equipment & Vehicle Training Coordinator, at the controls of the City of Kitchener's Hydraulic Excavator.

The simulator station consists of a desktop PC and a big screen display, both purchased by the city, along with a city-built operator chair using Simlog-supplied OEM Controls.

With the simulator station in place, the city staff then developed target values to serve as benchmarks for the simulation results.

Note: the City of Kitchener has kindly made those benchmarks available to Simlog to be shared with other Simlog customers looking for a suitable standard or starting point.

Simulator-based Training

City employees interested in becoming equipment operators, i.e. interested in upgrading their skills to earn a higher wage, now begin their training at the simulator station. There, they must demonstrate sufficient proficiency, as measured by the simulation results, before they may graduate to field training at the controls of a BHL (see "Field Training" later in this article).

City employees train at the simulator on their own time. To do that, they reserve time at the simulator station in blocks of two hours, both during typical weekday business hours but also in the evening and on Saturdays when city staff can be available to provide the necessary access. (The simulator is set up in a dedicated room, with a door that locks.)

The focus is on first working carefully but slowly to learn good habits, and then working carefully and quickly to come up to speed.

Note that this "on-demand" approach to simulator-based training is made possible because the city owns its own simulator station, rather than counting on the help of a local school.

About one week of simulator-based training is typically required to attain the necessary level of simulator proficiency, but the amount of effort varies from as little as 20 hours to as many as 80 hours. As for calendar time, these hours are typically spread out over 2-4 months.

Many city employees never attain the necessary level of simulator proficiency, and this can happen for two reasons:

1. Some people are just not sufficiently serious, so they stop scheduling simulator time and drop out.
2. It sometimes happens that serious people simply have insufficient operator aptitude, so despite continuing to train at the simulator, they fail to attain sufficient proficiency and also drop out.

To date, out of thirty city employees who began training at the simulator, just ten completed it with

success (by meeting the necessary benchmarks).

Stated otherwise, two-thirds of the applicants (20 out of 30 employees) were removed from further consideration by demonstrating insufficient interest, or operator aptitude, or both. In this way, the city was able to invest its limited training resources on just the most suitable one-third of the applicants, just 10 employees.

Field Training

New operators train at the controls of a city-owned BHL under the guidance of one of the city's experienced operators. (At the City of Kitchener, there is no equipment dedicated to training.) That training is at the city's expense, so that employees suffer no financial impact (but they continue to earn their current wage).

"Thanks to the simulator-based pre-screening and skills preparation, our employees are truly seat-time ready, and they ramp up quickly and safely," explains Rade. "Most need just about one week (30-40 hours) of field training to gain enough real world proficiency to pass our Practical Exam."

The overall Practical Exam usually takes up to 4 hours. Each of the 5 BHL operating tasks has a time benchmark associated with it, but the time allowed is not necessarily used to determine a Pass/Fail. However, according to Jerry Rade, "if a candidate looks like he/she will take 3 days to complete a task, I call it quits."

Candidates are primarily graded on compliance with applicable legislation, the ability to successfully complete the task, aptitude, and ability to problem solve in various conditions.

"The test, and my function as the tester, is not to determine if the individual is a great operator but if they're safe," says Jerry Rade.

With a passing grade, the employee now joins a pool of backup operators, ready to be called in as required. In this way, over time, the employee will also cross-train at the controls of other kinds of heavy equipment in the city's fleet. (While waiting to be called, the employee continues to work at his current job and earn his current wage.)

To date, of the ten employees who successfully completed their simulator-based training, eight have completed the field training and passed the Practical Exam. (The remaining two employees are waiting for field training to re-start once the winter months are over.)

Thanks to the simulator-based training, the City of Kitchener added six new equipment operators in 2008-2009 without *any* new hiring.

According to Jerry Rade:

"Those city employees with quite a bit of prior [BHL] experience go through the simulator-based training very quickly, spending most of their time changing their bad habits to meet the benchmarks we created." (One person needed just an afternoon at the simulator, but he was already working as an equipment operator.)

"Those with only some prior experience take a little bit longer since they have more new skills to learn, but don't have bad habits to change."

"For those with no prior experience, the biggest hurdle is to convince them that there is nothing wrong with the simulator, and that others have been able to meet and even exceed the benchmarks."

"Of course, there are those who just quit, and that's one of our biggest benefits, getting rid of the wannabes."

The simulator station consists of a monitor, PC, OEM Controls, brackets, and the City of Kitchener's custom-built desk and operator chair.

Simulator Return On Investment

Prior to the purchase of Simlog's Hydraulic Excavator Personal Simulator, no simulator-based pre-screening was taking place. Instead applicants were first interviewed and those deemed "qualified" went

on to take the city's standardized Practical Exam to test their skills at the controls of a BHL.

"I need 2 to 4 hours to prepare the test site depending on the condition from the last test, 4 hours for the test, and 1 hour of administration time," explains Jerry Rade. "Add the 4 hours for the candidate and you have a total of 11 to 13 man-hours per applicant for the Practical Exam."

In the 2008 - 2009 training season, 20 applicants were effectively eliminated from continuing on to take the Practical Exam. At an average of 12 hours per applicant, the city saved 240 man-hours thanks to the new simulator station. Based on various Province of Ontario salary data, at 160 hours of supervisor time and 80 hours for the applicants, this represents a cost savings of $16,000, not including savings on fuel and from reduced wear-and-tear on the city's equipment.

"With an initial investment of just under $10,000 for the Hydraulic Excavator simulation software license, Simulation Manager software license, and pair of OEM Controls, the simulator paid for itself within 6 months with a 150% return on investment on the first group of applicants alone," adds Rade.

Keys to Success

Here we summarize the principal keys to success by way of providing possible guidance to other municipalities:

- The combination of Simlog's Hydraulic Excavator Personal Simulator and Simulation Manager.
- The preparation of city benchmarks for the simulation results.
- The existence of a standardized Practical Exam to measure real world competency.
- The flexibility of the city's human resources policies.

Looking to the Future

The City of Kitchener expects to break ground in 2010 on a new Consolidated Maintenance Facility that will host a new simulator laboratory as part of expanded training program offices.

In that new facility, the city will be able to improve current training practises by adding new simulator stations both to train more people at the same time, and also to prepare employees for operating other kinds of heavy equipment, using other kinds of simulation software and simulator controls from Simlog.

This will allow a new Centre of Excellence in Operator Training to take shape, with plans to offer operator training services to nearby municipalities to promote best practices across the region and share operator training costs.

VISTA Training Inc. is a reseller of the Simlog line of personal simulators. To learn more, please contact:

Angela Remington at 800-942-2886 ext. 203 or via e-mail at aremington@vista-training.com.