



# Measuring the ROI in Simulation-based Training

Part 1 of the 4-part series *Your Complete Guide  
to Construction Equipment Training Simulators*





## Welcome to the first in our four-part series *Your Complete Guide to Construction Equipment Training Simulators*

In this installment, you'll learn about:

- the factors impacting the costs of traditional training
- the savings that simulation can provide right out of the gate, and
- the timelines you can expect for long-term savings and return on investment (ROI)

Along with ROI considerations, the series *Your Complete Guide to Construction Equipment Training Simulators* examines the benefits simulation can bring to the entire organisation, profiles of companies that have successfully deployed simulation, and the questions you should ask before buying.

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# Measuring the ROI (Return on Investment) in Simulation-based Training



The construction industry has seen steady growth over the past decade, fueled by significant building and infrastructure projects. However, finding skilled crane and heavy equipment operators is increasingly difficult.

For example, a 2017 poll indicated that over 75% of construction firms were having trouble finding skilled equipment operators.

There is no argument that operators need to be trained. However, training can be a risky activity.

Vehicle/equipment strikes are the leading cause of workplace deaths on construction worksites, and placing inexperienced operators on machinery can add unnecessary risk to the trainee, the instructor and the worksite in general.

Aside from the risk of injury, the cost of construction equipment training can be substantial. One company interviewed noted that renting equipment to train student operators costs between \$8,000-\$10,000 per month.

After adding wages, fuel, insurance, and maintenance, the annual cost of training can top \$100,000 per piece of equipment.

# The Hidden Costs of Operator Training and Assessment

Training recruits to the level of worksite-ready crane and heavy equipment operators is essential for a safe construction industry. However, conducting training programs on machinery has both direct and indirect costs, which should both be considered when evaluating the costs of your current training.

## Direct Costs

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**Equipment:** Having the machinery on hand is crucial to any training program. The price tag on construction equipment can be quite substantial; full-sized backhoes range between \$50,000 and \$80,000, motor graders can cost between \$200,000 and \$500,000, and tower cranes can stretch into the \$1-2m range. Even with discounted long terms rates, rentals of the same machinery can end up costing even more.



**Fuel:** Cranes and heavy equipment need fuel to power their engines and motors, whether that means direct combustion engines or generators creating electricity for motors. For every hour of use, there's a fuel cost that adds up quickly. For example, a new wheel loader, burning 3.75 gallons of fuel per hour, could cost between \$18,500 to \$22,500 in diesel per year.



**Maintenance:** In general, machines need to be kept in good working condition, including the parts required and the field-rate for mechanics making the repairs. Be sure to factor in lubricant and tires in your costs.



**Wages:** To train an operator, you need to have a certified, qualified, and trustworthy operator on hand to offer mentoring and supervision.



**Insurance:** Operators need to be insured against damages to protect both themselves and your organization as a whole.

## Indirect Costs

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**Productivity:** Along with paying an instructor to offer training, that instructor-turned-operator isn't contributing to an active project. If this person isn't a dedicated trainer, it's important to consider the effect their absence has on the work at hand.

Similarly, equipment being borrowed from the worksite to offer training has an opportunity cost as it could have been used to progress the job.



**Injuries:** Inexperience is a major factor in workplace injuries; therefore, student operators present an added risk. Injuries add significant costs to a worksite, with each workplace injury costing an average of \$38,000 in combined direct and indirect costs.

Worksite incidents often lead to reduced morale among employees. A talent drain can result if there's a perception that worker safety is a low priority, leading to a negative impact on the bottom line. In addition, the cost of replacing personnel can be substantial, especially when skilled labour is at a premium.

Indirect costs can include:

- Production downtime
- Administrative costs
- Negative media attention
- Potential OSHA penalties
- Attorney fees
- Damage to equipment, machinery, and facilities
- Higher worker's compensation premiums
- Loss of reputation
- Degraded client loyalty and support
- Managerial costs related to incidents including inspections, investigations, meetings, and administration
- Loss of employee time associated with assisting with incident recovery, administering first aid, and witness interviews

# The Savings of Simulation

Simulation holds key advantages when compared to traditional training. While simulation is noted as a “risk-free” training experience, it also offers a “cost-reduced” tool that can provide an experience transferable to the jobsite. Some areas of differentiation have been highlighted below:

## Direct Costs

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**Equipment:** With construction simulators ranging from \$10,000–\$100,000+ based on features, simulation fits many budgets at an investment point lower than most machinery.

Some simulation vendors have also developed simulation platforms that allow for interchangeable training modules.

This means that the equipment costs can be shared across multiple training programs, useful for larger organizations that previously required the rental or purchase of numerous machines.



**Wages:** With trainees requiring close supervision on real machines, instructors are limited to working in a one-to-one ratio with students.



**Fuel:** Aside from electricity and networking costs, fuel is not required for simulation-based training.



**Maintenance:** Like any other machine, simulators require maintenance to keep them running smoothly. The cost of repairing a simulator is much less expensive than the labor-intensive repairs needed on real equipment. As well, by lowering use time and therefore wear-and-tear on live equipment, items like tires and lubricant last longer and need to be replaced less often.



**Insurance:** Fewer incidents, medical claims, and worker's compensation payouts will result in a reduction in premiums. In addition, while student operators will need to be insured to use real equipment, reduced time spent on machines for training can also positively affect insurance premiums.

## Indirect Costs

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**Productivity:** Self-directed training can free up operator-trainers to be available for other tasks, such as productive, money-making work. Note that when operators get up to speed faster, this represents a net cost savings.

Similarly, machinery that has been repurposed for training can be put back into productive rotation.



**Injuries:** One of the key benefits of simulation is its safety. Simulator time is low-risk time.

## How CM Labs' Vortex simulators are helping to reduce training costs

*What used to take 8 to 10 hours of very intense one-on-one training to provide the skills foundation is now down to 4 to 6 with the Vortex simulator.*

- Dub Huggins, Training Manager, Crane Service Industries

*In one month, our Vortex simulator is used about 120 hours more than the equipment in the yard.*

- Mack Bennett, Business Manager, IUOE Local 178

*We've had about 9 guys where the only exposure they've had to a crane is the Vortex simulator — and after, they were able to go and pass their NCCCO crane certification practical exam.*

- Jeff Mitchell, Business Manager, IBEW Local 17

# ROI Calculations

The exercise of calculating the return on investment in a training simulator will be different for every organisation. Just as there is no one "right" way to train, there is no one "right" way to use a simulator.

Below is a sample ROI calculation, based on the assumptions outlined in the following table:

| Assumptions                                    |       |  |
|--|-------|--|
| Duration of course                             | 20    | days   |
| Number of students <sup>1</sup>                | 6     | per course   |
| Cost of fuel                                   | 2.843 | \$/gal   |
| Equipment use per day                          | 8     | hrs  |
| Equipment fuel efficiency                      | 10    | gal/hr   |
| Equipment types                                | 3     | machines<br>(e.g., excavator, dozer, wheel loader, grader, mobile crane, crawler crane, tower crane ...) |
| Maintenance                                    | 17.23 | \$/hr  |
| Instructor salary                              | 85000 | \$/year  |
| % intent to use simulator                      | 50    | % over equipment   |
| Investment in simulation products and services | 90000 | \$   |

<sup>1</sup> Does not include increased tuition received with new students

## Assumptions

- The more realistic the simulator the more seat time is optimized & skills transferred to the equipment
- Assuming ZERO incidents on the training site
- Assuming no time is lost on equipment due to weather

Based on these assumptions, here's how the training costs break down when you're training on dedicated equipment:

|  |                     |
|--|---------------------|
| Depreciation costs*/day<br>(based on equipment cost of \$250,000.00) | \$ 340.00           |
| Maintenance**/day  | \$ 137.84           |
| Fuel cost/day  | \$ 227.44           |
| Interest & insurance/day   | \$ 17.50            |
| Subtotal equipment cost/course                                       | \$ 14,455.60        |
| Trainer costs***   | \$ 7,555.56         |
| <b>Total costs/course</b>  | <b>\$ 22,011.16</b> |

For rental equipment, the costs are analogous:

|                           |              |
|---------------------------|--------------|
| Cost/day                  | \$ 850.00    |
| Fuel Cost/day             | \$ 227.44    |
| Equipment cost per course | \$ 22,048.80 |
| Trainer Costs***          | \$ 7,555.56  |
| Total costs/course        | \$ 29,604.36 |

## Notes

\* Based on depreciation of 1000 hrs per year, 5 year period, with a resell of \$85,000

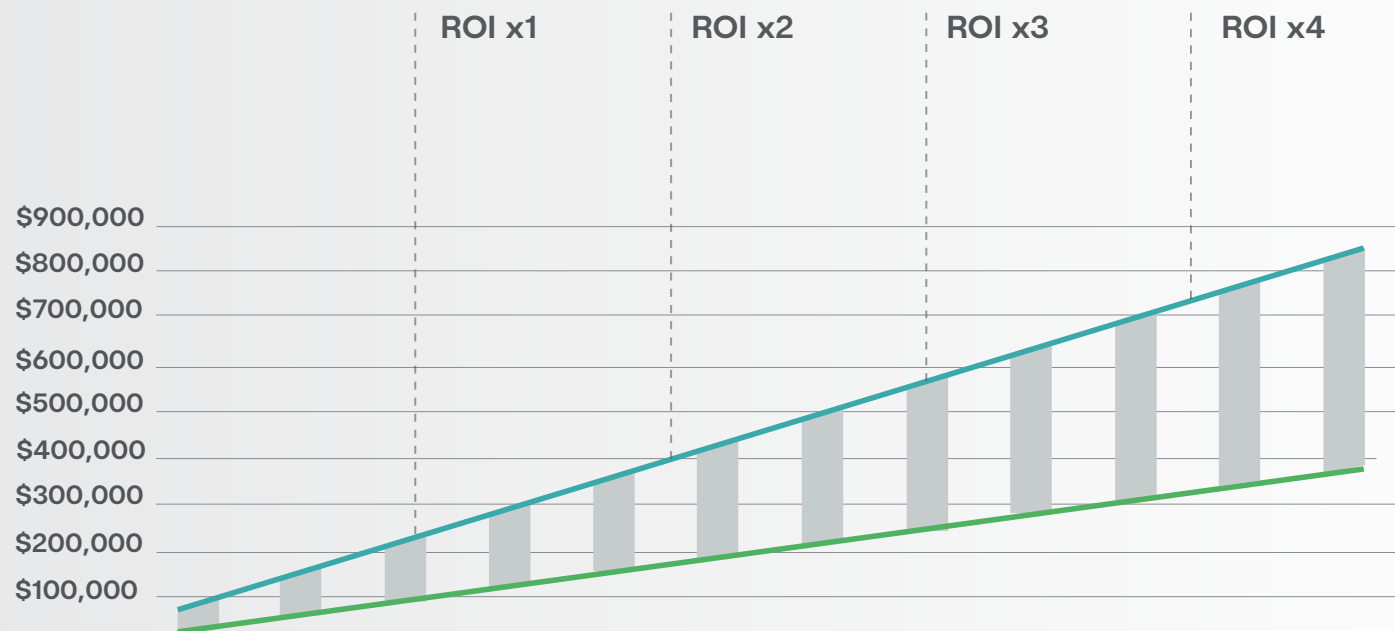
\*\* Based on 5 year maintenance, 1000 hrs per year

\*\*\* Based on 8 hour days



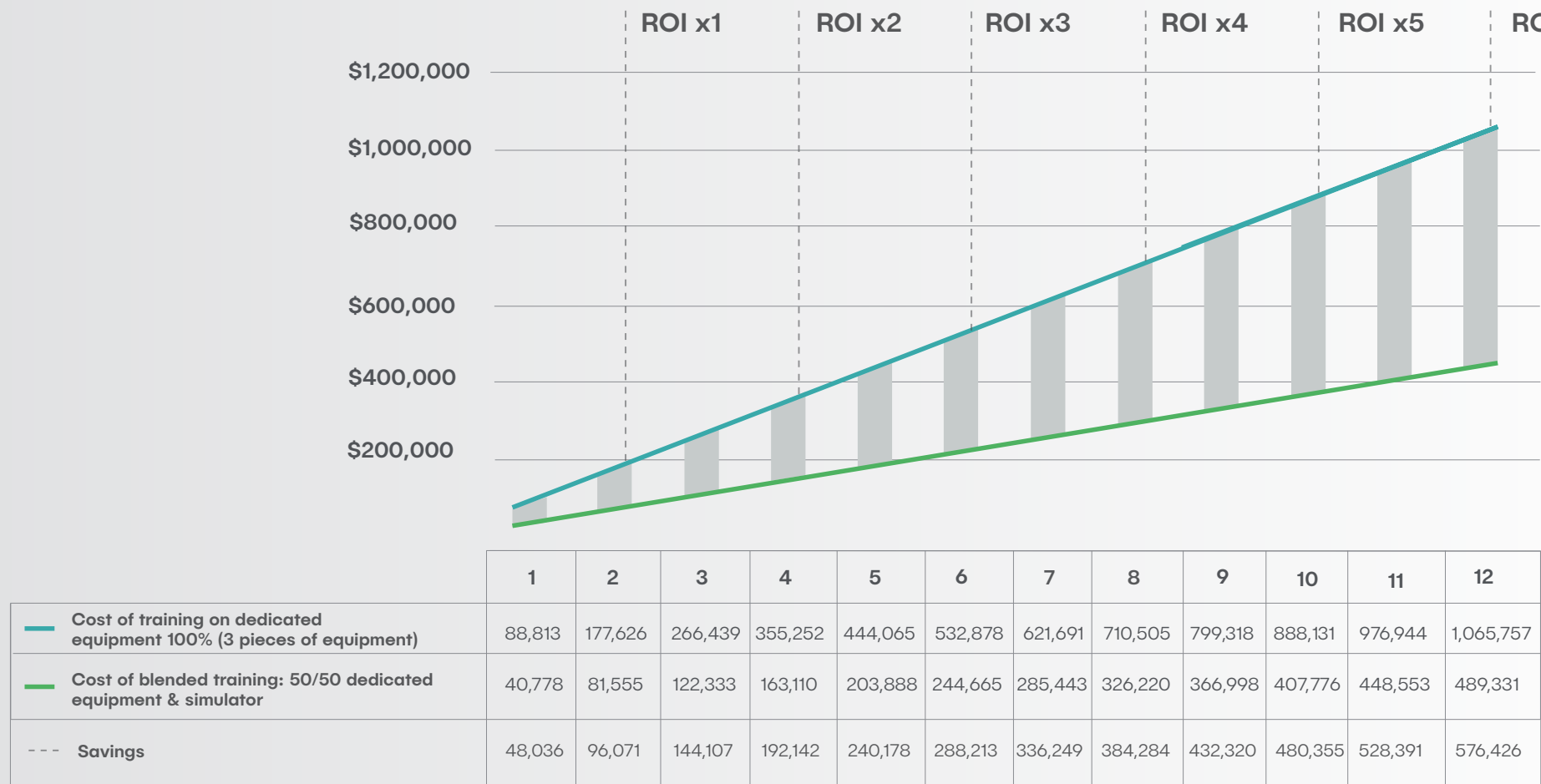
# Time to ROI When Using Simulation to Train for Three Different Equipment Types

Cumulative cost over 12 training courses  
(vs dedicated equipment)



|  | 1      | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10      | 11      | 12      |
|--|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| — Cost of training on dedicated equipment 100% (3 pieces of equipment) | 66,033 | 132,067 | 198,100 | 264,134 | 330,167 | 396,201 | 462,234 | 528,268 | 594,301 | 660,335 | 726,268 | 792,402 |
| — Cost of blended training: 50/50 dedicated equipment & simulator      | 31,254 | 62,509  | 93,763  | 125,018 | 156,272 | 187,527 | 218,781 | 250,035 | 281,290 | 312,544 | 343,799 | 375,053 |
| - - - Savings  | 34,779 | 69,558  | 104,337 | 139,116 | 173,895 | 208,674 | 243,453 | 278,232 | 313,011 | 347,790 | 382,569 | 417,349 |

# Cumulative cost over 12 training courses (vs rental equipment)



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