# CAT® SIMULATORS
## Develop a Heavy Equipment Operator Program

# EXECUTIVE SUMMARY

Developing a workforce has become an initiative in many locations due to the need for skilled labor. Working with local community colleges, tech centers, high schools and adult education programs, Cat® Simulators provide an easy-to-use, cost-effective, reliable training method for teaching heavy equipment operation by training students in the always-safe environment of a simulator before setting foot on valuable machines and running the risk of a mishap. Cat Simulators fit easily into academic curriculums. A combination of theoretical classroom training, simulation and actual machinery creates an experience that transfers better to real-world worksites. Cat Simulators include hardware featuring authentic Cat controls, working pedals and switches which combined with simulation software, replicates the actual applications an operator would perform in the real world. The motion system adds realism to tipping points and the feel of the machine. Simulation improves the learner's understanding of how the machine works and responds to real-world jobsites and environments. Once inside the simulated environment, learners must make decisions that will impact the outcome of the exercise (consequences) based on the actions and strategies they chose to maneuver through the exercise.

By way of simulation training, the learner gains understanding and organizes information in his/her mind and in turn builds a "mental model." Serious gaming simulations are based on input from subject matter experts—that's where the benchmark information comes from. These are Caterpillar experts who provide the "how-to" or methodology of how to perform the tasks within the simulated environment. In other words they provide the correct and accurate way to perform the task task to the programmers who develop the simulation software. This expert information ensures the student performs the tasks correctly and makes choices during the virtual situations (exercises) while discovering what the proper course of action should be from an expert. In the virtual training experience, learners develop a mental model of how to handle a situation depicted in the simulation, then when faced with the same situation in real life, they can refer to the mental cues they filed away.

## ACCURATE DEPICTION OF REALITY

Through simulation, learners can practice techniques and processes without disturbing worksites or actual machines. Virtual interactive environments, combined with working machine controls, provide an opportunity to gain familiarization of controls and learn machine operations and functions. From a management standpoint, using simulators allows multiple students to train at one time, anytime day or night without regard to the weather, and with one instructor supervising several students at once. Simulator training allows students the opportunity to repeat exercises as many times as needed to learn proper techniques.

With the addition of the Cat Simulators Motion System, the learner experiences a degree of tilt (forward, backward, left, right) that translates all the way up to the head. The key ingredients to the motion experience are Cat Simulators' proprietary software and physics engineering. The programming team works closely with third party motion specialists and a Caterpillar senior engineering specialist to provide very specific information to the motion system. In turn, the simulated machine's physics respond/react realistically to the environment, maneuvers and terrain interaction. VR Edition (available on some models) gives the user greater depth perception and a wider view of the environment for gaining greater accuracy during application training.

### 26,400
**Number of heavy equipment operators needed over the next 7 years, as predicted by the U.S. Bureau of Labor Statistics.**

### $66,253
**Average Heavy Equipment Operator salary in the U.S.**

# SKILL DEVELOPMENT

Not only will students learn the simulated exercises, they will also develop motor skills such as hand-eye coordination through the use of simulation. Additionally, students develop problem-solving and technical skills from learning the controls, switches and pedals, and the affect each movement has on the simulated machine.

Cognitive learning (declarative, procedural and strategic) is gained through simulation as well. Declarative knowledge, or the factual information that is stored in memory, is the part of knowledge that describes how things are. In the case of simulation training, processes and their attributes, and the relations between the processes, define the domain of declarative knowledge. For example, learning the correlation between how the control on a Small Wheel Loader works and using the control correctly to fill the bucket with a load of dirt.

Procedural knowledge, or knowing how to perform a task or complete an activity, can be demonstrated through the use of a simulator. Strategic knowledge, or transferring what the user has learned, happens when the user applies what he/she has learned on the simulator to real world situations.

Critical thinking, which encompasses reasoning, evaluating, problem-solving, decision-making and analyzing; plus time management are also skills developed through the use of simulation. For equipment operators, critical thinking comes into play

every time an exercise is undertaken. For example, when backfilling a trench with a Dozer, the operator must fully load the blade with material then push the material to the trench with the Dozer in the perpendicular position. The operator must complete this task with a minimum number of passes and allow extra material for compaction, staying within 6" of the existing grade. The student must think each step through while using the simulator for a successful session. Decision-making must be concrete during simulation sessions. Students must perform each step of the exercise correctly in order to "pass." The very nature of a serious gaming simulation exercise is that the user can fail the exercise when he doesn't meet the benchmarks set within the software. The user can see what he did wrong and strive not to make the same mistakes again. The decisions that the operator makes during the exercise directly affect the outcome of the session. Even when users "fail" a session, there is an opportunity to learn.

## SYSTEM EVALUATIONS

In each simulation session, students are tasked with meeting benchmarks set within the software. Cat Simulators track the outcome of the sessions by recording and reporting the results to a database (accessible to instructors). Live machine evaluations are one way to determine whether an operator is capable, however it's challenging for the instructor to record every detail and reaction while also judging an operator's performance. Additionally, each instructor may evaluate an operator's performance differently, making it difficult to compare the results. By utilizing a simulator, along with reporting software, instructors can easily assess students' machine operation skills effectively.

For current students, assessments can help to determine what their strengths and weaknesses are and what types of further teaching is necessary. Correcting bad habits and identifying machine misuse become much easier through the use of simulators. Instructors can set important benchmarks to determine a student's aptitude, then test and evaluate in a simulated environment.

## COST SAVINGS

Institutions that use simulators for part of their training can experience immediate cost savings. Training students on actual machines can mean a greater chance of mishaps, unplanned maintenance and additional fuel costs. However an organization can avoid these additional costs when incorporating simulators into their curriculum. Schools using simulators may also benefit from reduced insurance premiums due to fewer accidents to students, machines and other property. Plus, less claims can mean lower insurance premiums.

Additionally, in traditional training situations, one instructor trains one student on one actual machine. When organizations use simulators for training, one instructor can train multiple students at one time — even training on multiple machine types by using convertible controls.

## PRODUCTION BUILDING

While production levels are not a priority to a college for teaching curriculums, they are important to organizations that students will be employed by after graduation. Teaching future operators to maximize productivity will help businesses keep a healthy bottom line. Cycle times including excavating, loading, hauling and dumping, all contribute to productivity. However, operator contribution is the cornerstone to the productivity process. In other words, the more skilled the operator, the more efficient the cycles, the better the bottom line. Cat Simulators consistently teaches the same techniques used on actual worksites by operators worldwide.

## SAFETY AWARENESS

As new operators enter the workforce, the chances for critical incidents rise because of inexperience. In a simulated environment, students can perform exercises and make mistakes without harm to themselves, other students or the training site—while gaining knowledge and confidence. Simulators will minimize the risk of error and accidents for students.

Attitude, a part of affective learning, can impact safety training for better or worse. Attitudes are often changed because of simulator training. An example would be an Off-Highway Truck driver driving more safely because he jumped a berm or hit a rock during the simulation and turned his truck over during the exercise. Or a Hydraulic Excavator operator setting a trench box, misses his target and collapses a trench. In both scenarios, the users learned something valuable from the outcome of the exercises. Anxiety can also be reduced by being exposed to situations during simulation. By confronting a situation that causes anxiety in real life through a simulator (i.e., driving down a steep hill with a full load), the user can desensitize the fear without the danger of physical harm.

## NEXT STEPS

Talk to our team at Cat Simulators! We will help you start a heavy equipment operator program or add simulators to an existing program. We have a proven track record of success with schools all over the world. Not only can you get heavy equipment simulators with real time reporting, we also offer SimScholars™ online curriculum with instructor guides, lesson plans, student lessons, quizzes and more. The combination means students receive training for jobs safely in the virtual world and accurately with Cat-approved machine techniques.

**LEARN MORE ABOUT SIMULATION & DEVELOPING AN HEO PROGRAM**
learn@catsimulators.com | 1.309.266.2640

# WHY CAT SIMULATORS?

As the premier simulation development company for Caterpillar, our team at Simformotion™ LLC, the licensee for Cat® Simulators, focuses on giving our customers a world-class experience from start to finish. Our 12+ year partnership with Caterpillar gives us access to machine data and models, physics engineers, operator experts and other professionals who consult on each simulator throughout the development process. The products are not generic, meaning the simulated machine and the techniques featured in the exercises are built to exact standards and feature training as Cat would teach it. Hardware is engineered using authentic Cat controls.

### CATERPILLAR LICENSED & BRANDED
The only compact simulator on the market licensed and branded by Caterpillar Inc., Simformotion works closely with Caterpillar groups to ensure all specifications are met.

### AUTHENTIC HARDWARE
Virtual interactive environments, based on real-world worksites, are combined with a simulated machine engineered with genuine controls, pedals and switches. The authentic hardware ensures learners practice operating the machine using the same controls as found in the actual machine. Choose from full simulators or compact models.

### SUBJECT-MATTER EXPERTS
Caterpillar subject matter experts work closely with our 3D development team to ensure each exer-cise is realistic and follows best practices. The techniques and procedures featured in the simulated machine are the same ones used at worksites around the world.

### MACHINE WALKAROUND
Cat Simulators feature an exclusive walkaround training exercise that teaches pre-operation machine inspection procedures and ensures proper operating and safety conditions. This is the same walkaround that must be performed before operating an actual machine. Users must learn parts and identify any faults in the machine before operation. Identifying a $500 part repair today can help avoid a costly $10,000 repair tomorrow.

## SYSTEM EVALUATION

Cat Simulators can track simulation sessions by recording and reporting the results to a database (accessible to instructors). Users are tasked with meeting benchmarks set within the software. Assessments can help to determine what each user's strengths and weaknesses are and what types of further training is necessary.

## LIVE TRAINING

Simformotion employs a staff dedicated to training. Well-versed on machine training and simulator training, our trainers teach customers how to use the simulators to get the most out of their simulator investment. They make sure customers understand how to use the simulators to train their students and operators. Training can be conducted in person or via live-streaming.

## SIMSCHOLARS™ CURRICULUM

Cat Simulators' exclusive SimScholars™ online curriculum is available
for specific simulated machine models.

## TECHNICAL SUPPORT

Cat Simulators' technical support and maintenance team is available 24/7/365, ensuring our clients are never alone. Along with our technical support, we offer customers access to a dedicated Support website. Once a Cat Simulators system is purchased, customers receive access to our Support site, with set-up and assembly videos, documents, troubleshooting and training information at their fingertips.

## MULTIPLE LANGUAGES

Simulators are available in multiple languages.

## CONVERTIBLE CONTROLS

Full simulator models feature convertible
controls for the same base unit.