THOROUGHTEC™
simulation

CYBERQUIP™
simulator system

CONSTRUCTION EQUIPMENT SIMULATORS

" Simulators are an essential part of our skills development programme and have prepared operators for the real world."

> *Physically accurate vehicle cab*
The trainee operator executes all driving, loading, hauling, grading, dozing and dumping tasks from a highly accurate replica of the cab interior. The seat is surrounded by fully functional controls including steering wheel, joysticks, switches, gauges, levers and pedals. The vehicle's functionality is customisable to match factory options.

A SIMULATED VEHICLE THAT LOOKS AND FEELS REAL

Poor operator skills and habits can have a significant impact on safety and productivity in construction operations.

CYBERQUIP construction simulators use cuttingedge simulator technology and highly sophisticated training techniques to rapidly develop and hone operators' skill and experience levels without exposing your equipment or operators to unnecessary risks or removing operating equipment from the production cycle.

ThoroughTec's high-fidelity simulators are true to the original vehicle in every way, from the ergonomics of the cab with authentic replication of the operator interface, to highly accurate behavioural characteristics of the equipment being simulated. CYBERQUIP ADTs, backhoe loaders, bulldozers, graders and excavators operate in a high-fidelity 3D construction site where the operator can perform the full range of functions, interacting with artificially intelligent vehicles and workers. Dedicated areas are provided within the construction world to provide for the training of specific loading, hauling, dozing, excavating and grading tasks and emergency situations.

It's in this world that your operator will hone his or her skills and experience, so that your construction site operates as safely and productively as possible.

Operating a CYBERQUIP ADT, backhoe loader, bulldozer, grader or excavator is like operating the real vehicle, but without the high costs and inherent risks.

Authenticity and accuracy

Every CYBERQUIP simulated cab makes use of original components and specifications to create an ergonomically correct and accurate replica of the original. All simulated vehicle behaviour dynamics, including those of vehicle, blade and boom articulation, sophisticated hydro-pneumatic suspension and continuous tracks are based on detailed mathematical models that use vehicle manufacturer specifications to provide accurate behavioural realism. As a result full the operating tasks for each vehicle are an accurate reflection of reality.

Highly customisable

CYBERQUIP simulators are extremely accurate replications of the original vehicle, including custom procedural or operational features that have been included on the customer's own equipment. For example, with the inclusion of rear-view camera systems or additional lighting systems.

Any ADT, backhoe loader, bulldozer, grader and excavator model from any OEM manufacturer can be simulated, along with any OEM optional features.

> *Advanced soil and terrain modelling*
ThoroughTec Simulation uses advanced soil and terrain models to complement equipment simulation, such as deformable soil models for the vehicle dozing, grading and loading simulation, allowing realistic terrain interaction and fill factors. The traction properties of the terrain change according to the weather for a more authentic operating experience.

> *Advanced vehicle behaviour models*
All simulated vehicle behavioural dynamics are based on detailed mathematical models that use OEM specifications to provide realistic behavioural response of the machine to operator inputs. Complex physical interactions such as those involved in vehicle and boom articulation, continuous track and hydro-pneumatic suspension are simulated to an extremely high level of fidelity for realistic visual and tactile feedback during the entire length of the training situation.

> *Multiple configurable scenarios*
Virtual worlds includes a number of load-haul-dump, excavating, dozing and grading exercises, each set in an appropriate area for the objective. This includes:

- Hauling
- Loading
- Pipe laying
- Trench digging
- Battering
- Ramp construction
- Handling of subterranean boulders

> *Variable world settings*
Trainees are introduced to a number of scenarios that they may encounter under real operating conditions.
This includes:

- Light levels (day or night)
- Visibility (good, mist or fog)
- Weather (rain, sun)
- Emergency situations
- Critical vehicle failures
- Rubble spillage
- Automated ADT behaviour patterns

PHYSICALLY ACCURATE VIRTUAL CONSTRUCTION WORLD

Trainee operators are immersed in an extensive high-fidelity 3D construction site featuring full operating functionality, as well as artificially intelligent support equipment and construction workers commonly seen in such an environment. Advanced soil modelling is used for highly realistic interaction between the construction world and the vehicles.

The weather and time of day can be manipulated to cover various operating conditions, while world specific parameters and interactive events can be adjusted for broader operator experience.

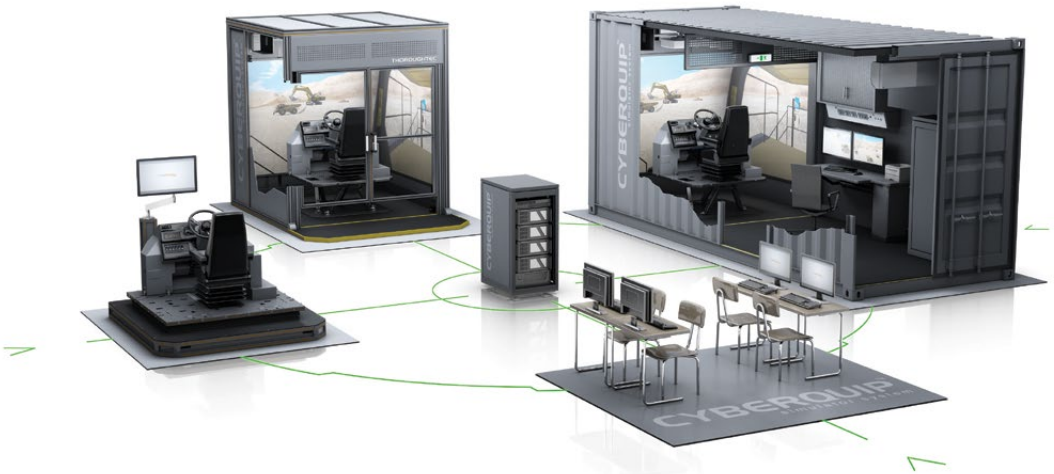
The world has been modelled on a typical construction site, with all the appropriate working areas to test the operator with various scenarios and procedures.

TRAINING AND EVALUATION TOOLS TO MAXIMISE SIMULATOR EFFECTIVENESS

Exercises can be configured to address various training requirements, including operations with different characteristics such as surface traction, sub-system failures such as transmission or steering system failures, and advanced emergency situations such as brake failures, engine fires or burst tyres.

The operator's exercises are continually monitored and recorded, as are instrumentation states, controls interaction, adherence to safety procedures, correct equipment handling techniques and response to emergency situations and failures. The instructor is able to continually monitor, in real time, controls and parameters such as vehicle and engine speed, selected gear, articulation angle and service brake position. At the end of each exercise, the instructor is provided with a set of reports covering various aspects of operation. For example, a productivity report details quantifiable returns for each loading, hauling and dumping cycle, levelling accuracies, blade load and a summary of the productivity of the total exercise, including number of alignment attempts, time to load, mass of the load dumped, percentage of load dumped, as well as average tonnage and number of cycles per hour, are recorded. Operator evaluation is against a set of predefined checks for the cab type and is categorised into health and safety, machine use and productivity enhancement.

These performance reports provide a complete training and evaluation system for construction equipment operators.



The Complete CYBERQUIP Training Solution

A range of ISO 9001:2008 certified training tools linked to a central student database for a seamless progression from new recruit to a productive operator

> *Computer Based Training (CBT)*

- Developed with Registered Training Organisation (RTO)
- Fully interactive multimedia content including photographic still shots, 2D and 3D computer animations and video with audio overlay
- Remote instructor station
- Integrates fully with CYBEQUIP FMS and OFT systems
- Wide variety of course topics: machine introduction, roles and responsibilities, production techniques and machine operation in emergency situations

> *Operator Familiarisation Trainer (OFT)*

- Familiarises operators with new equipment
- Identification and basic operation of the instruments and controls of a specific machine type
- Utilises interchangeable CYBERQUIP vehicle cabs
- Fully adjustable touch-sensitive HD screen
- Exploration, Training and Evaluation modes of operation
- Video and audio feedback to the trainee

> *Full Mission Simulator (FMS)*

- High fidelity simulation for comprehensive operator training
- High resolution projected displays with 270° or 360° field of view
- Utilises interchangeable CYBERQUIP vehicle cabs
- Active force feedback steering (as required)
- 6DOF motion platforms
- Spacious instructor station with dual HD screens
- Containerised or fixed facility units

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CYBERMINE simulator system
CYBERQUIP simulator system
CYBERWAR simulator system

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