

PREPARE FOR REALITY



TENSTAR
simulation





WELCOME TO OUR WORLD OF SIMULATION

OUR MISSION

is to minimise emissions, increase efficiency and improve safety during and after operator training in construction, transportation and agricultural industries.

OUR VISION

is to be the leading global provider of simulation based educational tools for the construction, transportation and agricultural industries.

TENSTAR SIMULATORS

Construction

- Wheel Excavator
- Track Excavator
- Wheel Loader
- Tower Crane
- Dump Truck
- Dozer
- Grader
- Telescopic Handler
- Mobile Crane

Transport

- Truck with trailer
- Long Hauler
- Bus
- Car
- Truck with trailer
- Wheel Loader
- Crane Lorry
- Timber Crane Truck
- Forklift
- Mobile Crane

Agriculture

- Tractor
- Wheel Loader
- Combine Harvester
- Telescopic Handler
- Forwarder
- Forestry Harvester

= Developed machine types

= Planned development

COMBINATION SIMULATOR

Several machines in one simulator

Tenstar Simulation offer the unique ability to combine several different machine types within the same simulator hardware providing the benefit of flexible and cost effective learning.



WHY SIMULATION FOR TRAINING?

Improve students through increased and more efficient training hours

Simulation is a way to recreate a real situation in a safe controlled environment. A simulator allows the user to experience an extensive effective training in a safe and secure manner. Low investment and a positive environmental impact are other great benefits.



Safety

Allows students to train in a safe, secure and relaxed environment that provides an effective learning. They can practice extreme situations and operations without risking injury and machine damage resulting in downtime of machines.



Effective training

Simulators allow more students to practice on their own without the teacher's presence, regardless of season and weather. The teacher has access to students results and may subsequently monitor and evaluate student's work and skill in the reporting tool. There is also the opportunity to practice special scenarios and accessories such as a tiltrotators and gps systems.



Investment and operation cost

The operating cost of a simulator compared to an actual machine is just a fraction in comparison. A simulator is a great addition to an actual machine and an effective way to keep costs down. The investment in a medium-sized excavator corresponds to many training simulators.



Non-polluting

A simulator system has only 3% of the environmental impact of an actual excavator. Using simulators contributes to an improved environment while creating an attractive environmental profile for schools and organisations.

HARDWARE OPTIONS

MOBILE UNIT

Equipped with three portrait or landscape 48" LED screens and a optional reverse screen. Possibility of multiple machine types in the same hardware.



Pedals (exchangeable)

Pedals for throttle, clutch and brake.



Track pedals for track excavator.



Steering wheel

Adjustable steering wheel with the orange FNR lever.



Seat

Professional driver's seat with a low back. We use the best and highest quality from BE-GE in Sweden.

HARDWARE OPTIONS

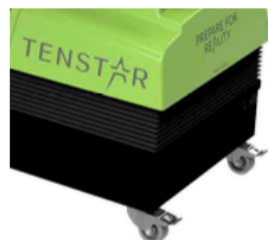
MOBIL UNIT - with motionbase

Equipped with three portrait or landscape 48" LED screens and a optional reverse screen. Possibility of multiple machine types in the same hardware.



Rear Screen

Rear screen is a possibility for several machine types.



Motion base

Tenstar motion base is a 3 DOF (Degree of freedom) platform. Using advanced motion pattern technology which enhances the feeling of working in an actual machine.



Multi joystick & keypad

Custom designed levers for functionality in both Harvester and Forwarder.



Joystick and armrest with touchscreen

The levers are of the highest quality combined with an ergonomic armrest. Settings and functions correspond to real equipment. The touch screen is used as a supplementary control for accessories and machine functions.

HARDWARE OPTIONS

DESKTOP

Equipped with one or three landscape 48 "LED screens. Different screen sizes is optional. Available setup with steering wheel and pedals and / or joysticks for several machine types.



VR-READY

Virtual Reality glasses allows you to look around in the working area with better depth preception that further enhances the sense of reality.



HARDWARE OPTIONS

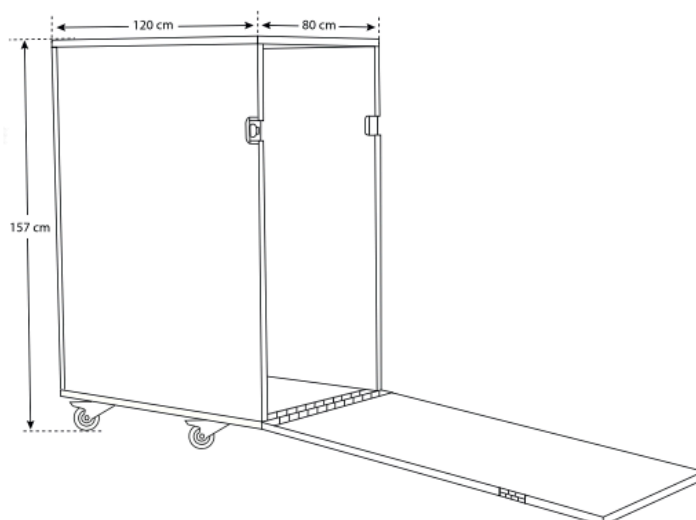
CRANE LORRY

This setup includes controls via radio remote controller and one LED display.



TRANSPORTABLE

All our simulators are easy to transport, they are made to fit on a euro pallet, 120x80 cm. We have also designed a special transport case for the simulators with shelving and straps to hold pieces securely in place.



REALISM

Tenstar graphics are designed with an emphasis on real machine models and actual working environments. All machines are programmed and developed with respective markets to create realism, machine feeling and real world scenarios.

PROFESSIONELL HARDWARE

+

LIFE LIKE GRAPHICS

+

ACCURATE MACHINE BEHAVIOUR

=

CREATES REALISM



EXERCISE CONTENT

The Tenstar training simulator is delivered with different training packages increasing in difficulty. Each machine consists of logical training sections with a number of educational exercises. The exercises are designed with a strong focus on control and safety.



INTRODUCTION

Introduction to the machine followed by routines before and after driving with random scenarios every time the driver carries out the exercise.



DRIVING

This part has exercises for the maneuvering of the machine/vehicle. Machines like track excavator and dozer are most of the time on the jobsites and are quite different to maneuver than for an example a telehandler. Vehicles with steering wheel like wheel loader and even more trucks are commonly used also in the traffic where exercises are existing.



BASIC OPERATION

This part starts with very basic and simple exercises for the beginner and slowly increase the level of difficulty.



SAFETY

The exercises are including general as well as specific safety aspects that are measured in the scoring system.



ADVANCED OPERATION

The exercises is handling more and more difficult tasks as well as specific scenarios that usually is hard to do in reality.



MACHINE ACCESSORIES

Several advanced exercises with increased challenges that require greater skill and accuracy together with different accessories, for example, GPS systems and tilt rotators, bucket attachments etc.



MME - MULTI MACHINE ENVIRONMENT

Allows several users and machines to work in the same site environment promoting communication and teamwork. Highlights all the aspects of efficient machine movement methodology. Adds a new layer of cooperative learning to simulation based training further preparing students for reality.



TSS - TENSTAR SCORING SYSTEM

TSS - Tenstar Scoring System, offers scoring results based on Safety, Quality and Economy. It enables evaluation, feedback and incentives for the student's progress and development. This allows the teacher to follow each student's development and provide personalized instructions. The scoring system enables real-time feedback to the student, which ensures continued and focused improvement in important areas. Students and teachers can review continued development over time and get help identifying areas that need further improvement.

Tenstar Scoring System awards points on each attempt measured against quality, safety and economy. The points can then be communicated back to the student providing effective feedback on the performance. Students and teachers can review continued development over time helping to identify areas requiring further improvement.

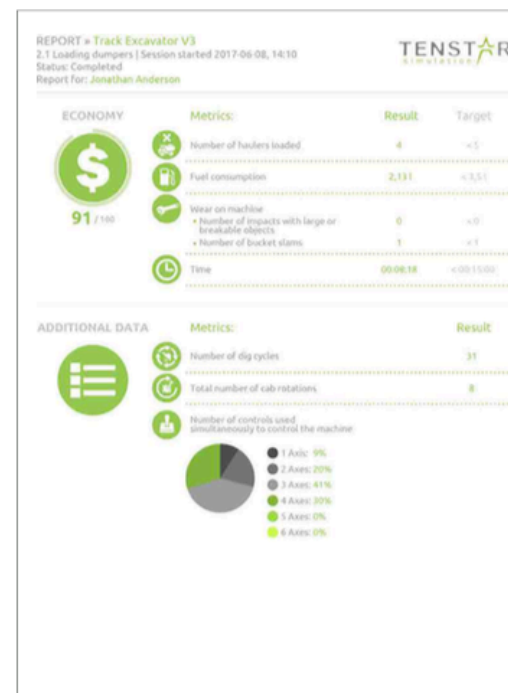
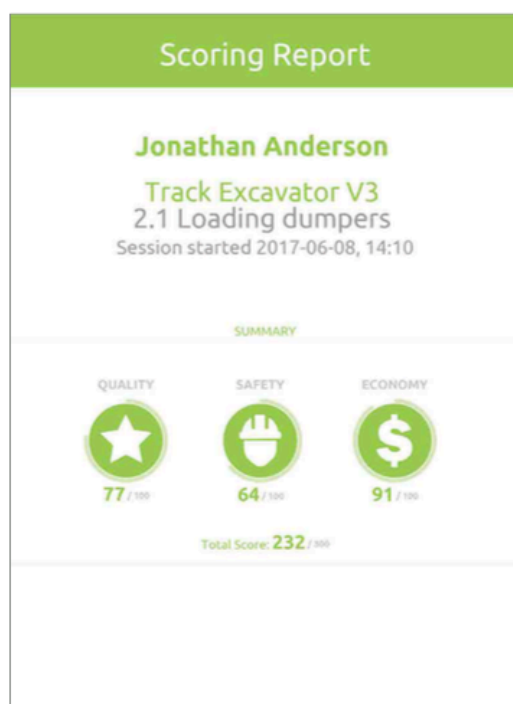
Real time reporting during the exercise for example bucket height load is released from during loading, fuel consumption and bucket clatter.

The simulator stores various behaviors and actions the student makes as metrics during the exercise and weight these to calculate a specific score as well as an overall score.



Teacher tools for follow up

- Create student profiles and allocate them to different classes or groups.
- Gradually make more exercises available as the student progresses in their training.
- Register of training results for instructors to evaluate.
- Possibility for instructors to send feedback messages to students.
- Printing and exporting training results.





MME - MULTI MACHINE ENVIRONMENT

Several users in the same environment

MME - Multi Machine Environment, allows several users and machines, to work in the same environment promoting communication and team-work. Adds a new layer of cooperative learning to simulation based training further preparing students for reality.



Chris Bushell, Curriculum Manager at the National Construction College (Plant and Construction Services) says:

Simulators provide a safe learning environment and a fantastic training opportunity for learners of all levels, to improve their operating ability. The simulators are an excellent training aid, capturing learners' performance via data recording, helping tutors better understand individual needs. They provide us with the ability to track learners' progress by recording data, which helps us to target their training and help them achieve their qualification.

Examples of Multi Machine Environment

Construction machines - tracked excavator, dump truck and dozer

One excavator loading two dump trucks delivering materials to one dozer



Agricultural machines - tractor and combine harvester

The combine harvester drains grain in the tractor container tank while driving in tandem



Warehouse - counter balanced forklift

Up to four forklift simulators collaborate on the same warehouse.

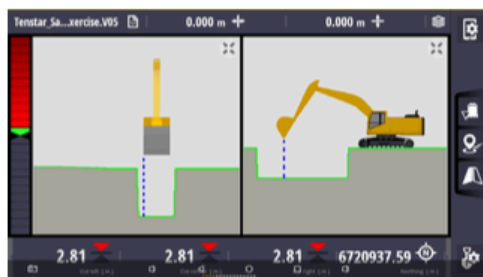


MACHINE CONTROL TRAINING SIMULATOR

Tenstar simulators are compatible with the major manufacturers of machine control system such as Trimble, Leica, Topcon and Novatron. Our simulators have the ability to train the user in both 2D and 3D work site applications from simple 2D trench work to more complex 3D highway grading.

Example of exercises:

1D - Flat



2D - Trench/Parkinglot



3D - Highways



With a wide range of preset work scenarios the operator can gain a full understanding of the system from within a classroom environment prior to using the system on an actual machine and site. This ensures the operator is productive on site from day one rather than losing vital time and money during training periods on site when both the machine and operator are traditionally stood down from site production activities.

Setup

The simulation will be optimised to run on Tenstar's standard hardware setup with three portrait screens and a rear screen plus a touch screen, track pedals and joysticks adding a specific screen for Machine Control or utilising the included virtual Machine Control.



The Excavator

The machine is a 24t tracked hydraulic excavator with the addition of a full range of grading and digging buckets plus a tilt and rotate attachment.



Virtual Machine Control

Developed by



Distributed by



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