

Passenger Car Simulator „Trainer“

Type: F12PT-3/L43

Product Description and Technical Specification



General

The simulator serves not only the purpose that the handling of the operational elements in a short time, fuel-efficient, environment-friendly, without wear and tear, and without risk for man and machine can be trained, but it can also be used without any regard to weather and traffic conditions. Further advantages of simulators are the reproducibility of traffic situations, the replay after driving failures, the repeatability of exercises and the exact evaluation of driving and operating mistakes. A special advantage is that trainees are confronted with unexpected situations, which may happen in real traffic but, due to the danger, cannot be integrated in the educational program. So the simulator serves the operational control as well as making decisions. Due to its high-tech image and its reliable objectivity it is appreciated by all users.

Driving Stand:

The casing is a compact, robust construction with original Ford-components including a large steering wheel. It is equipped with manual gearbox. The simulator can be used in automatic and in a manual mode. The dashboard is replaced by a flat screen and adaptable. The seat is adjustable in two degrees of freedom. The stand is equipped with the required controls for driving of a car such as:

- Steering wheel
- Gearlever (6+Eco+reverse)
- Accelerator pedal
- Brake pedal
- Clutch pedal
- Wiper lever
- Indicator lever
- Handbrake Button
- Light controls
- Speedometers, temperature engine instrument, RPM-meter etc.
- Start-Engine Button



Sight System

The Sight-system is built out of three 43" LED screens. The complete system enables a virtual horizontal sight angle of view 180-degrees. The screens are mounted on a robust steel stand.

Simulator Computer Hardware

For each Simulator a normal-shaped personal computer is used. The PCs are of new commercial standard.

Technical Characteristics:

Operating System: Windows 10, 64Bit

CPU: QUAD Core.

RAM: 8GB

Graphic card: NVIDEA, Current model.

Audio System

The audio system comprises two channels and at least two loudspeakers. The loudspeakers are of the active type, so that they can be connected directly to the audio output-signal of the PC. They are accommodated in the car-cabin.

All sounds are made by sampled recordings, especially the engine sound, which is dependent upon the revolution and the torque of the simulated engine. Other sounds are starter, squeaking tyres, crashes, rain, drive wind, splash water, scratching tooth wheels, traffic and human voice.

Software Performance of the Driving Computer

The software includes driving dynamics, noise generation, graphics generation, data base, virtual objects, scenarios, training/curriculum, menu control, adaptation to the customer country's conditions and evaluation.

Driving Dynamics

The characteristics of a real vehicle is simulated. Any parameters as maximum speed, acceleration, deceleration at braking, vehicle mass, torque/revolution-characteristics, gear ratio, maximum power, and wind resistance are modifiable. Also longitudinal and lateral accelerations are computed. At excessive centrifugal acceleration in curves the tyres drift to the outside, so that the barrier may be touched.

Graphics Generation

Picture resolution 1920 x 1080 pixel per channel, colour depth 24 bit (true colour). The images have texture mapping with anti-aliasing.

Data Base

The virtual world comprises rural, mountain and urban roads, highways and motorways. The courses include crossings, traffic lights, traffic signs, rises and falls, forest, entrances and exits for motorways. The complexity of the road-network is limited to 2 lanes per direction on intersections and 3 lanes per direction on motorways.

Virtual Objects

The system offers houses, cities, wood, many extras, traffic signs, animated pedestrians and animals. There are cars, trucks, buses, motor cycles, cyclists and other vehicles.

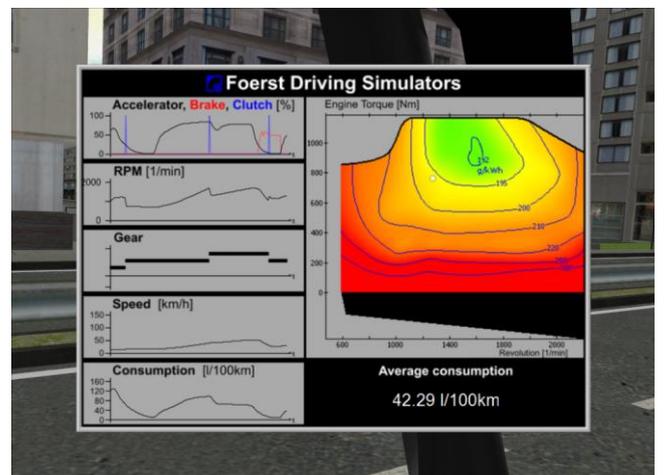
Rear Mirrors

The images for the left and the right exterior mirror are generated and displayed on LCD screens. They show all virtual objects from the back side and all following and removing road users.



Replay and diagrams

The simulator provides the possibility to show a complete replay of the last driven scenario. There is a possibility for fast forward, fast backward, stop and play. The view point is a helicopters view. Additionally the simulator can show diagrams of the most important parameters during the replay (if requested also during the ride)



Traffic

The traffic includes at least 30 road users with artificial intelligence, comprising passenger cars, trucks, pedestrians and cyclists, who may at the same time appear in the view range. They observe the traffic rules, the distance to the foregoing vehicle and the speed limits, come to a stop before red lights and crossing traffic, accelerate and decelerate in a natural way and may be passed. Obstacles are put into the scene with critical timing to cause sudden reactions. Collisions between the own car and other road users or obstacles are detected and cause reduction of the speed to zero with text edition. Run-on accidents, frontal accidents and others are detected and indicated.

Computer Diagnosis

Any technical input- and output data are shown on a diagnosis table in the menu on demand.



Curriculum & Scenarios

This section gives short descriptions of the implemented scenarios. The descriptions focus on educational goals. The details of the scenario implementations depend on the difficulty level and the country version. Some scenarios may be missing on your simulator, if your simulator lacks the necessary operational elements to properly execute them.

The Simulator offers following scenario-modules:

- Standard Training
- Road Safety (Risk Awareness and Alcohol Simulations)
- Manoeuvring with Trailer
- Eco-Training
- Motor Sports
- Free Driving

On the next pages the contents of the various modules is explained



Basic Training

Controls

The trainee is made acquainted with the positions and the functions of the most important operational elements of a vehicle. They comprise: Accelerator, brake, clutch, gearshift, light switch, windshield wiper switch, indicator, starter and ignition.

Clutch In

The trainee learns how to clutch. The objective is to repeatedly start and stop the car.

Start and Gearshift

The student learns to start the car, clutch, accelerate and decelerate. Economic gear choice is also trained.

Steering

In order to train steering, the car is switched to automatic gearshift. A red ball marks the correct viewing distance. The difficulty levels differ in the width of the driving lane.

Stop and Go

The driver is caught up in a traffic jam and must repeatedly brake and accelerate. In higher difficulty levels, he has to also deal with down- and uphill slope.

Braking

The student is confronted with several sudden situations. He should quickly react and perform a full braking. The reaction time is measured as well as the braking and stopping distance.

Straits

It is not always possible to keep to one's own driving lane. The student trains the correct behaviour in narrowed traffic situations.

Choice of Speed

The driver trains to keep the correct speed in various situation and environments

Overtaking

The student trains how to overtake slower vehicles .

Traffic Rules

The objective of this scenario is adherence to various traffic rules (speed limits, right of way, regulating signs).

Other Road Users

Others do not always adhere to traffic rules. The student is confronted with several variants of such misconduct.

Gap Acceptance

In heavy traffic and various turning situations, the driver has to wait for an adequate gap in order to merge into the running traffic. He should neither endanger other traffic participants nor impede following traffic by waiting for an unnecessarily long time.

Motorway

The Trainee drives on a Motorway. Including entering and exiting the motorway as well as lane choice and choice of speed.

Driving in Fog

The drive starts at good sight. Suddenly a fog bank emerges, which requires an adapted speed. Various dangerous situations occur, which, at not adapted driving style, almost unavoidably lead to an accident.

Driving in Rain

The drive is absolved in dense rain. The driver has to cope with bad friction, aquaplaning and bad sight conditions.

Driving at Night

The driver is confronted with the bad sight conditions at night-time. He must correctly switch between high-beam and low-beam light.

Additional it will be also feasible to drive in the database in a “Free Driving Mode”



Road Safety (Risc-Awareness)

The program "Road Safety" is meant to be used for hazard perception training. To this end, it offers a set of scenarios featuring critical situations in various surroundings. The driver is required to properly react in order to prevent an accident. Using an alcohol simulation, the traffic scenarios and the contained hazard situations can be used to demonstrate the dangers of driving under the influence of alcohol.

Additional all scenarios can be combined with the following weather conditions: Sunny, dawn, night, rain, fog or snow.

City - 4 different scenarios. Driving time 3-5 min. Each containing various hazard.

Rural Roads - 4 different scenarios. Driving time 3-5 min. Each containing various hazard.

Motorway - 2 different scenarios. Driving time 5 min. Each containing various hazard.

Mountain - The driver trains driving in the mountains. In particular, he is confronted with serpentines and tunnels.

The rides comprise various hazard situations like:

- Animals on the road
- Pedestrians passing the road
- Parking cars starts
- Road damages
- Unclear situations with limited view
- Blind bend
- And many more

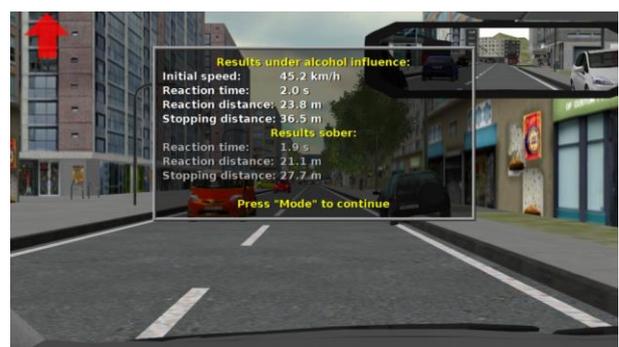


Single hazard situations can also be selected separately. (Duration about 30sec)

Scoring:

At the end of every road safety scenario a "Score" will be calculated and shown in the evaluation table. Based on 100% points are subtracted for every mistake during the ride. To the bottom the score is limited to 0%.

During the ride the ride can be "frozen" by the instructor and after an event some information like reaction time, stopping distance etc. is given.

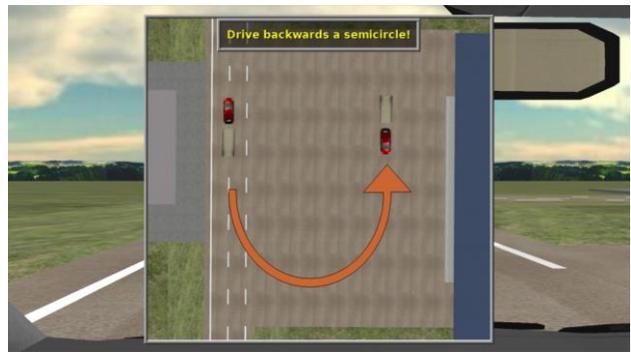


Manoeuvring with trailer

This Program offers the driving of a passenger car with a trailer. In different scenarios both driving forward and backward with a trailer will be trained.

This program offers seven scenarios with different driving tasks.

- Driving with trailer
- Slalom around Pylons
- Following the road backwards
- Turning with side road
- Circle drive backwards
- Parking backwards
- Free maneuvering



This program allows the permanent computation and the display of the current and average fuel consumption during a simulation ride.

The following techniques for fuel-efficient driving can be trained:

- overrun fuel cutoff by engine braking when decelerating
- early gear switching, using the highest possible gear when driving uphill
- avoidance of unnecessary braking and acceleration manoeuvres
- anticipatory driving style

Rides in the City, in suburban area, on a rural road , a motorway and in mountains are available.

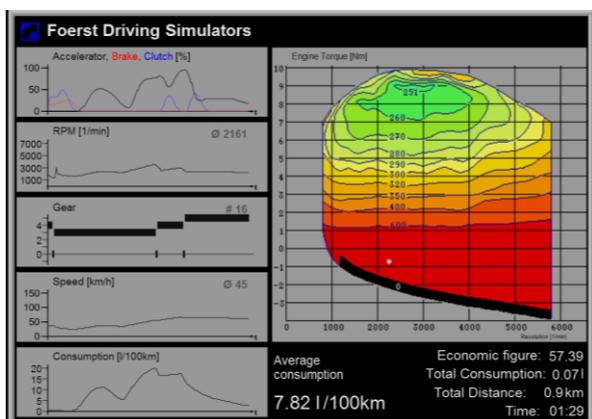
The fuel consumption of the simulated medium-class passenger car is calculated as a function of motor torque and revolutions per minute.

The position of the accelerator pedal, the speed and the current fuel consumption are diagrammatically shown as functions of time. The average fuel consumption is also constantly calculated and displayed. The specific fuel consumption (i.e. fuel consumption in relation to power output) is displayed as a point in the engine map to the right of the other diagrams.

The engine map visualizes by graphical means the physical fact that combustion engines work most efficiently at low revolutions per minute and almost open throttle valve. The axes represent the revolutions per minute and the mean piston pressure. The latter is proportional to the engine torque. The blue lines are lines of constant specific fuel consumption. The areas between them are coloured green for low consumption to red for high consumption.

A small marker square shows the current working point of the engine as determined by the trainee's driving style.

By observing the movement of the working point, one can see how the driving style influences the fuel consumption. Not only does the consumption rise with rising speed, but also it falls when choosing higher gears. By carefully choosing the right combination of torque and revolutions per minute when accelerating or going uphill, it is possible to save fuel while still moving swiftly.



With the aid of your Foerst simulator drivers can be taught how to handle a vehicle when going to extremes. The simulator offers the choice between a state-of-the-art formula 1 race course with narrow curves, falls and rises or a blocked off rural road, which is easier to handle.

The training gives the driver a good insight into the physics of driving and helps develop an experienced and steady driving style in all situations. In addition, it offers a fun aspect, the real-world counterpart of which is not easily accessible to driving trainees.

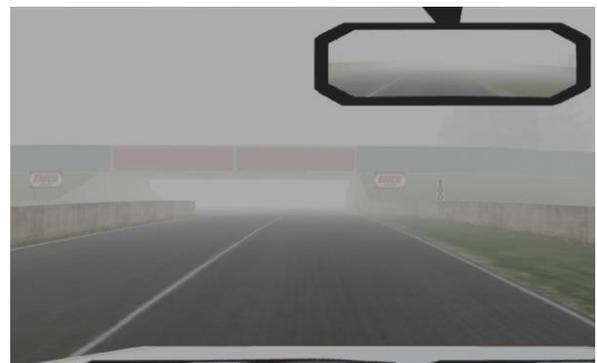
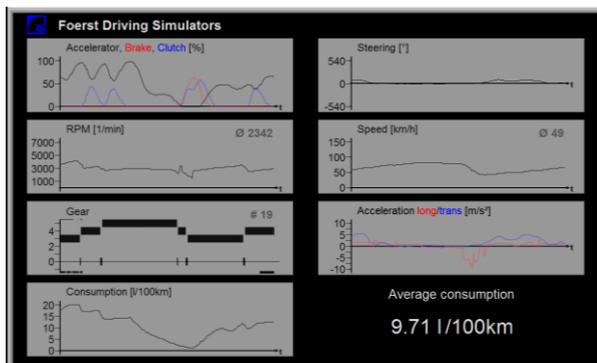
Some of the aspects of driving physics, which can be shown using the Motorsports program are:

- Loss of road grip due to centrifugal forces
- Loss of wheel grip due to acceleration and deceleration
- Interaction between lateral and longitudinal forces (accelerating forces reduce lateral support and vice versa)

It should be noted, that driving under extreme conditions uncovers some fundamental restrictions of driving simulators, because the forces on the driver cannot be felt to the full extent as in reality. This leads to a systematic underestimation of the true speed of the own vehicle, making it harder to feel the limits of the own car than in reality. This problem is partially addressed by a slight exaggeration of car inclination. Nevertheless, in the simulator it is harder to go to the limits than in reality and easier to cross these limits. For the fun aspect, we therefore offer a special kind of 'tyre' with unrealistically good road contact.

Races on two different racing circuits with 12 or 24 opponents are available.

All rides can be combined with the following weather conditions: Sunny, rain, fog, night and dawn.



Free Driving

“Free driving” means, that you do not have to obey a training curriculum or are exposed to a fitness assessment, but that you may choose your speed and track by your own. Several parameters for the drive may be adjusted in the menu.

The program “Free Driving” offers the following choices:

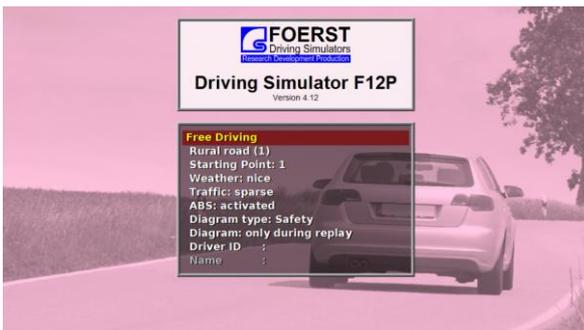
Various Courses

Various starting points

Various sight and road surface conditions

Traffic density

The virtual world comprises rural, mountain and urban roads, highways and motorways. The courses include crossings, traffic lights, traffic signs, rises and falls, forest, entrances and exits for motorways.



Option: Control Desk (not included in the Basic Version):

The simulator can be supervised with aid of the control desk which offers the needed administrative services and the possibilities to start, trace and manipulate scenarios. Enhanced replay functions which are also showing diagrams of the most important information offers comprehensive post briefing.



Software Features of the Control Desk

- Replay functions include fast- forward and backward, slow motion and multi-angle perspectives (Drivers view, top-down view, helicopters view)
- Handling of drivers data
- Possibilities to create new sequences of scenarios.
- The instructor monitor the ride from various perspectives by aid of two three- dimensional views.
- The instructor is able to manipulate the scene by manually inserting or changing vehicles, weather conditions and various events.
- Overview information is provided including all current simulator status (preparing, executing, evaluating), instrument and pedal status and current drivers failures.

The control desk comprises one PC and two 22" LCD Screens. . It is placed outside of the simulator.

General Restrictions of Driving Simulators

The following statements are valid for any driving simulator. They are independent from a special brand or manufacturer.

Kinetosis warning:

Driving simulators might cause a kind of dizziness called kinetosis. The producers of simulators try to minimize this effect, but it cannot be fully avoided.

Limitation of complexity:

There will be always a gap between "virtual reality" and "reality". The full complexity of real traffic in regard of graphical environment, traffic behaviour and force-feed back can't be reached. Please check our catalogues, descriptions and products to see the current level of realism.