FOERST
Driving Simulators
Research Development Production

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Passenger Car Simulator „Drive Zone“

Type: F12PA-3/L32

Product Description and Technical Specification

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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 driving stand is a robust steel construction. The steering wheel is a device with a diameter of 30cm and force-Feedback. It is equipped with manual gearbox which offers 6 Gears + Economy Gear and a reverse gear, The simulator can be used in automatic and in manual gear-changing mode. The dashboard instruments are shown on the main monitors. The seat is adjustable in two degree of freedom. The stand is equipped with the required controls for driving of a car such as:

- Steering wheel (Thrustmaster)
- Gearlever (6+E+Reverse)
- Accelerator pedal
- Brake pedal
- Clutch pedal
- Indicator-lever
- Various Control Buttons on Steering Wheel.
- Racing Seat. Adjustable in one direction (forward-backward, No Safety belt)

Sight System

The Sight-system is built out of three 32” 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
- CPU: QUAD Core.
- RAM: 8GB
- Solid-State-Disc - Drive
- Graphic card: NVIDEA, 1660 or better

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/revolvation-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 (Full HD), 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

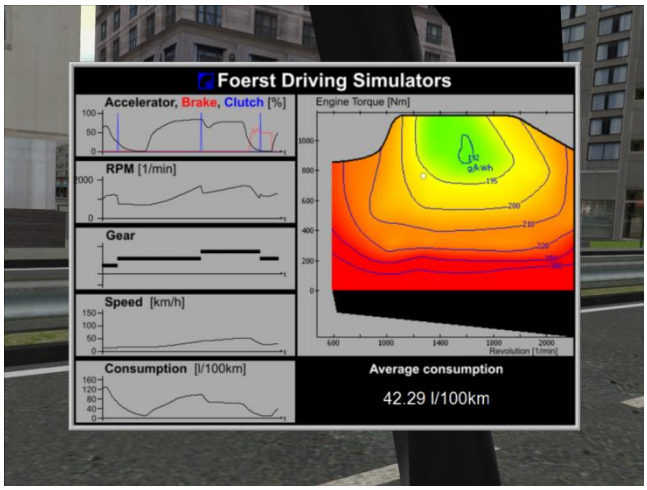
The system offers houses, cities, wood, many extras, traffic signs, animated pedestrians and animals. There are cars, trucks, buses, motor cycles, cyclists and other vehicles.

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. Additional 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:

- Basic Drivers Training
- Road Safety (Risk Awareness and Alcohol Simulations)
- Manoeuvring (with and without Trailer
- Motor Sports
- Free Driving

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

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 difficu 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 f braking. The reaction time is measured as well as the braking and stopping distance.

Overtaking

The student trains how to overtake slower vehicles. The difficulty levels differ in road shape and traffic density.

Traffic Rules

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

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.

Lane Changing

In various situations the driver is forced to change lane. The correct behaviour during a lane change is trained. Later, the choice of lane on multilane roads is trained.

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.

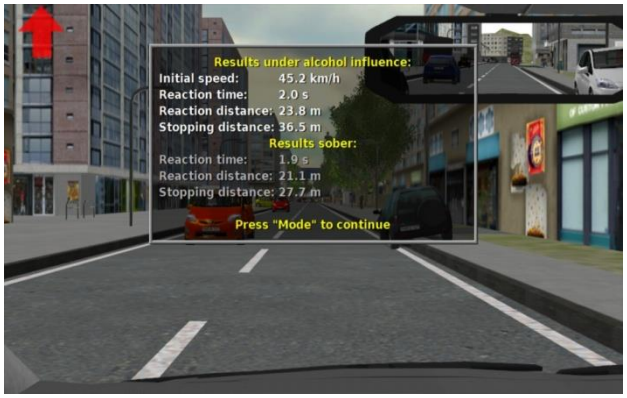
The rides comprise various hazard situations like:

- 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 “freezed” by the instructor and after an event some information like reaction time, stopping distance etc. is given.



Motor Sports

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.

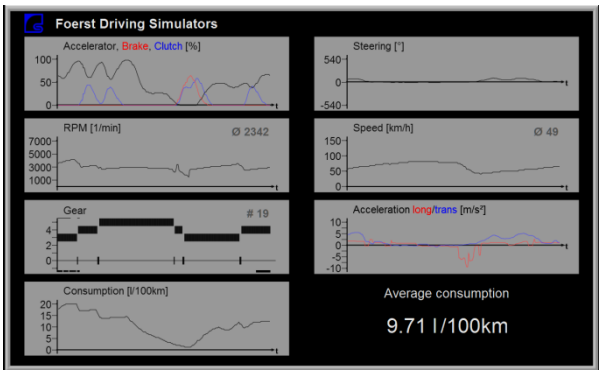
Some of the aspects of driving physics, which can be shown using the Motorsports program are:

- 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 condtions: Sunny, rain, fog, night and dawn.



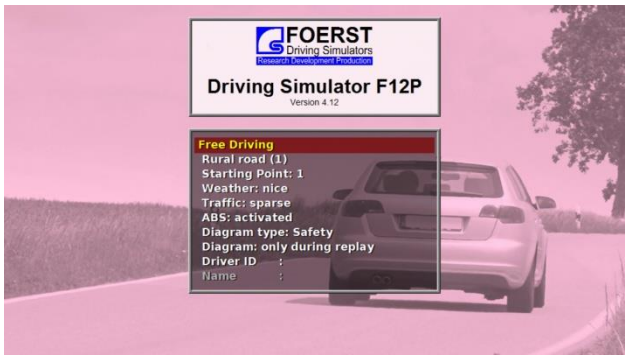
Free Driving

“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.



Headtracking-System (Option)

A special camera is mounted in front of the driver. The camera is able to analyse the head-position of the driver. This gives the System the possibility to check if the driver in looking into side roads, checking the mirror and if he looks over his shoulder correctly.

Chip Card System (Option)

The Simulator can be equipped with a chip card system.

The chip card identifies the driver,

provides access authorization,

learning progress in the curriculum is shown,

performance in the specific lessons and

time left on the time account, to be refilled.

25 prepared cards are comprised,
more cards can be ordered, labelled with your branding on demand.

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. This effect is enhanced by the use of the VR-headset.

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.