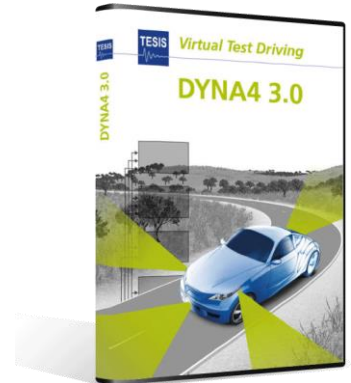


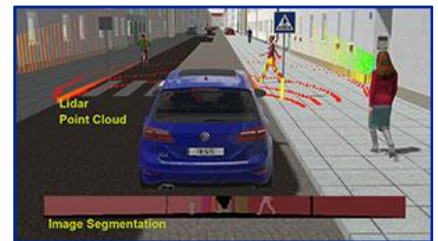
Quick Overview

- **GPU based sensor simulation:** Lidar, radar, ultrasonic, cameras and object list
- **Euro NCAP 2018 scenarios** incl. cyclists and night scenarios
- **Seamless integration with HiL test platforms:** Easy export of vehicle and maneuver as run-time datasets
- **Interfaces** to ROS and ADTF for closed-loop function development
- **Platform support** of latest Matlab, dSpace, NI, Vector and ETAS versions
- Range of **model improvements** for tires, steering, energy analysis, traffic behavior
- **3D visualization** with DYNAanimation:
 - Many new objects including tunnel, motorcycles, bicycles, vehicles and road infrastructure
 - Automatic animation scene generation according to the selected scenario and vehicle model
- **DYNA4 Engine:** Combustion process and exhaust aftertreatment
- Improved **ease of use**
 - Enhanced usability with new perspectives
 - New preconfigured example projects for a quicker start



Sensor simulation: Physical simulation of environment sensors

- For development and test of ADAS/AD functions
- Physical modeling of ultrasonic, lidar, camera and radar sensors
- Automatic semantic image segmentation for all visible objects
- Receiver modules for function development in Simulink and ROS
- Maximum time and cost efficiency by calculation on the GPU of a standard PC



Details and videos: www.tesis.de/en/sensorsimulation

Lidar point cloud and image segmentation

Euro NCAP 2018 scenarios

- Virtual test drives for AEB and FCW functions
- NCAP scenarios with pedestrians (CPFA, CPNA, CPLA) by day and by night
- NCAP scenarios with bicycles (CBNA, CBLA)
- NCAP vehicle scenarios with Soft Car (CCRs, CCRb, CCRm)
- Automated report generation

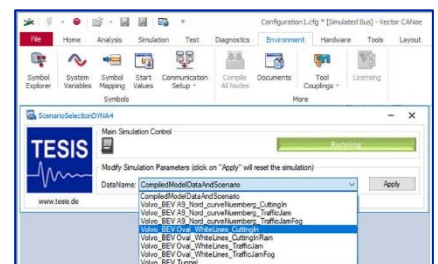
Details and videos: www.tesis.de/en/ncap



Euro NCAP scenario with bicycle

Seamless integration with HiL test platforms

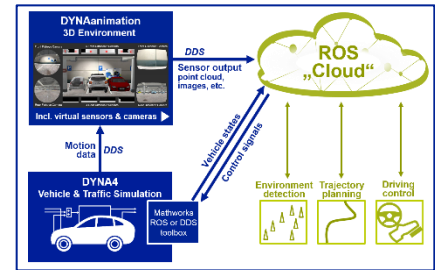
- Easy export of vehicle and maneuver as run-time datasets
- Seamless integration in Vector Canoe node-layer dll and user files, dSpace ControlDesk datasets, ADTF filter
- Test engineers retain their preferred toolset, no DYNA4 knowledge necessary
- Run automated ECU tests without Matlab
- 3D visualization with DYNAanimation



Seamless integration in Vector Canoe

Interfaces to ROS and ADTF

- Closed-loop simulation for function development of ADAS/AD functions
- Function developers retain their preferred toolset and benefit from high-fidelity driving dynamics, GPU sensor models and 3D visualization
- Co-simulation with DYNA4 via flexible DDS communication or
- Export DYNA4 models as ADTF filter



Co-simulation with ROS via DDS

Range of model improvements

- TMeasy 5 tire model reflects tires' inflation pressure
- Improved tire test rig and tire fitting when using FTire as reference model
- Support for MF-Tyre 6.2 tire model
- Open interface to traffic simulators such as SUMO
- More flexible positioning and routing of traffic
- Power steering configurable for rack assist & variable steering gear ratio
- Steering wheel torque as input in lateral maneuver
- Torque vectoring with multi-disc clutches model
- Smoother controller guidance signals with moving average filter
- Energy analysis for batteries considers more influencing factors



Maneuvers with different tire inflation: www.tesis.de/en/tmeasy/

3D visualization with DYNAAnimation

- Automatic animation scene generation according to the selected scenario and vehicle model
- Variations of vehicle and scenario parameters such as road, weather, traffic, vehicle and sensors directly affect the animation through module-specific animation data
- Many new objects including tunnel, motorcycles, bicycles, vehicles with complete light setup and road infrastructure
- New OpenDRIVE features such as updated road-sign catalog, selection of different road textures and automatic generation of bridges



Tunnel and lights



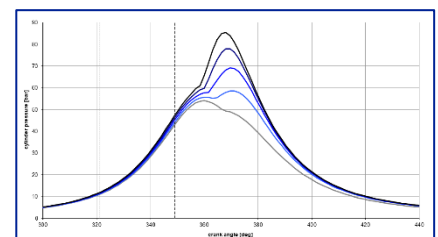
Cyclist on bicycle lane



Roadworks infrastructure on motorway

DYNA4 Engine

- Engine models with adjustable level of detail to test control units
 - Cylinder pressure and temperature profile in real time
 - Dynamic air mass flow and gas composition with turbo chargers
 - Spark and compression ignition
- Preprocessing workflow for easy parameterization from measurements
- Method for simulation of dynamic NOx concentration and exhaust treatment



Crank angle resolved cylinder pressure

Improved ease of use

- Enhanced usability with new perspectives
- Improved performance of DYNA4, DYNAanimation and models
- New preconfigured example projects for a quicker start
 - Complex crossing with international roadmarks and traffic
 - Roadworks with narrowing lanes
 - Parallel parking in city environment



Complex crossing with traffic

Parallel parking in city environment

Roadworks with narrowing lines

Updated platform support

- Matlab up to R2018b
- dSpace up to R2018-A
- NI VeriStand up to 2018 now also with 64bit Matlab
- Vector Canoe up to 11.0
- ETAS LCO up to 5.4.4
- ADTF 2.x

Many more on demand.

Overview: <https://www.tesis.de/en/compatibility/>



Interested in virtual test driving with DYNA4?

DYNA4 is highly modular and can be tailored to your needs.

Find out more about the features and packages we offer:

<https://www.tesis.de/en/dyna4>

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