Digitrans

Digitrans Outdoor Rain Plant

Test infrastructure for rain tests of automated vehicles and their components

www.digitrans.expert

Why did we build an outdoor rain plant?

Due to the increasing automation of vehicles, more and more responsibility is being transferred from the driver to the vehicle.

Bad weather affects the performance of sensors (e.g. visibility in heavy rain) and actuators (e.g. deceleration/acceleration on wet surfaces), which is why it is particularly important to test these extensively in adverse weather conditions, such as rain.

However, the test options with natural precipitation are only suitable to a limited extent. The given weather conditions cannot be controlled at the touch of a button, nor can the precipitation conditions be reproduced with the exact intensity and droplet size distribution over a longer period of time.

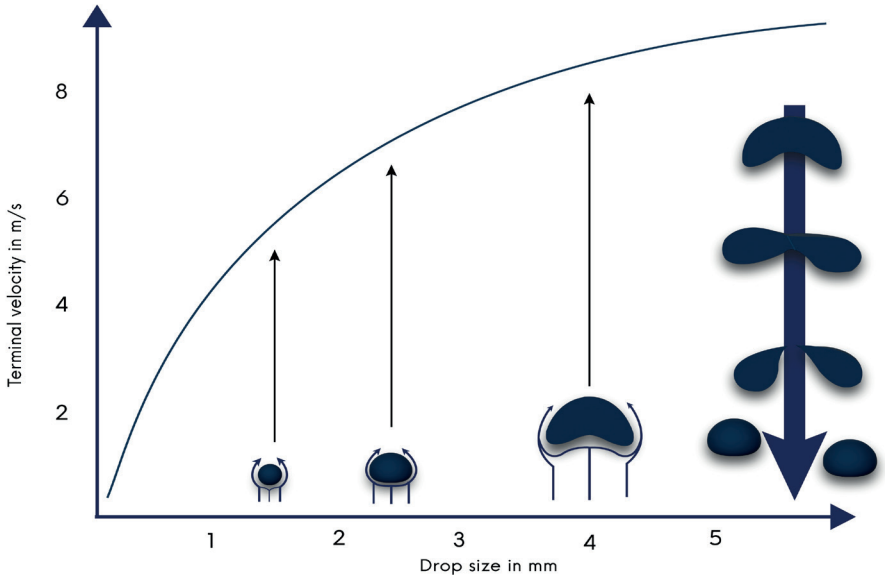
After extensive research into rain and rain systems, we came to the conclusion that there are currently no systems on the market that meet the known requirements.

For this reason, we decided to implement a completely new type of outdoor rain plant. The aim was to find a configuration that, on the one hand, simulates natural rain in the best possible way and, on the other hand, also covers a specific area that can be found in light and heavy rain conditions in Europe.

What is rain in nature?

What do raindrops look like?

The shape of a raindrop varies depending on its size and speed of fall. From a size of 5 mm, the drop splits.



What are the rain intensities?

Basically, there are three different intensities:

- **Light rain**
- **Medium rain**
- **Heavy rain**

Particularly in the case of natural rain, it can be clearly seen that different intensities occur within a period of time. As a result, only average values can be determined within a certain period of time. For optimal testing purposes, however, constant amounts of rain are required.

A high rain intensity of approx. 100 mm/hour results in a possible selective failure of sensors.

The outdoor rain plant enables constant, reproducible intensities over a longer period of time, thus ensuring optimum test conditions.

What does the droplet size distribution indicate?

The droplet size distribution indicates the quantity and size of raindrops falling. The size is measured by the diameter of the drop.
The rain intensity correlates with the droplet size distribution.

Digitrans Outdoor Rain Plant

Measures

- Length: approx. 80 m (incl. Crossing area)
- Height: approx. 10 m

Rain intensities

- light rain: variable between 20 and 30 mm/hour
- heavy rain: 100 mm/hour

Irrigated lanes

- two in light rain
- four in heavy rain

Specialities

- natural droplet size distribution
- homogeneous over the entire test area
- accurate simulation of real rain conditions
- creates a consistent and reproducible environment

What can be tested with the outdoor rain plant?

With the outdoor rain plant at the Digitrans Test Center for Automated Driving, a variety of different tests and investigations can be carried out to evaluate and improve the safety and performance of automated vehicles and their components under realistic weather conditions.

Among other things, the following tests can be carried out:

1. **Dynamic tests**
   such as lane changes, intersections and merging into traffic
2. **Tests with spray and water surge**
3. **Sensor development and validation**
   Testing and validation of sensors, e.g. during heavy rainfall
4. **Visibility of road markings in rain and wet conditions**
5. **Groundtruth referencing**
6. **Comparison of dynamic and static weather data**

What additional services do we offer?

Provision of weather data by modern road weather station
This provides information on the complete, prevailing weather data such as.:

- water film height on the road surface
- road temperature
- road conditions (dry, damp, wet, icy, snow-covered)
- wind temperature, direction and gusts
- rainfall intensity and type

Tests also possible in the dark thanks to lighting system

- state-of-the-art lighting system over the entire test area
- sunset spotlights for tests with simulated glare

Possibility of video recordings from seven different angles

- seven cameras are mounted on the steel structure
- useful for evaluating the results and for documentation purposes

Digitrans

DigiTrans GmbH, Hamerlingstraße 42, 4020 Linz, Austria | Phone: +43 732 60 46 59 | Mail: office@digitrans.expert

www.digitrans.expert