



Laboratory and sampling vessel „MAX PRÜSS“

The mission: to help protect the environment

In the main, the cleanliness of rivers and streams depends on human activities. Industry, trade, residential population, agriculture, and shipping all contribute to their pollution. Pollutants enter the waters through various means. North Rhine-Westphalia Office of Nature, Environment and Consumer Protection (LANUV) continuously monitors the quality of all bodies of water in the state, from creeks, rivers, and lakes to shipping canals and wastewater treatment plants. Only through comprehensive monitoring can the effects of water pollution and the need for water conservation measures be assessed.

To monitor major rivers - such as the Rhine or Weser- and shipping canals, sampling at locations that are difficult to access is unavoidable. These include river sections in front of industrial and port facilities or the estuaries of large tributaries. Another requirement is the sampling of longitudinal and transverse profiles, for which several samplings are necessary, either in the cross-section from bank to bank or longitudinally in or against the direction of flow..





The MAX PRÜSS operates on the Rhine and its navigable tributaries as well as on the Weser and the western German canals. It is equipped for sampling and basic laboratory work. This allows for the collection of samples of water, suspended matter, sediments, and biological specimens. MAX PRÜSS is mainly tasked to carry out non-routine measuring patrols as well as accurate sampling and sample preparation. Since modern pollutant analysis in the ultra-trace range can only be performed in specially equipped laboratories, detailed sample analysis is not performed on board, but at the LANUV's land-based laboratories.

The tasks of the MAX PRÜSS fall into these categories:

- Surveillance and investigation,
- Sample collection and
- Measuring.





Special missions include:

Investigation of plume formation

With the help of the MAX PRÜSS, the formation of wastewater plumes can be investigated under different hydrological conditions. Wastewater does not mix immediately with river water at the point of discharge, but forms plumes of wastewater until river water and wastewater are fully mixed. They can occur, for example, on the Lower Rhine over a length of 70 kilometres.

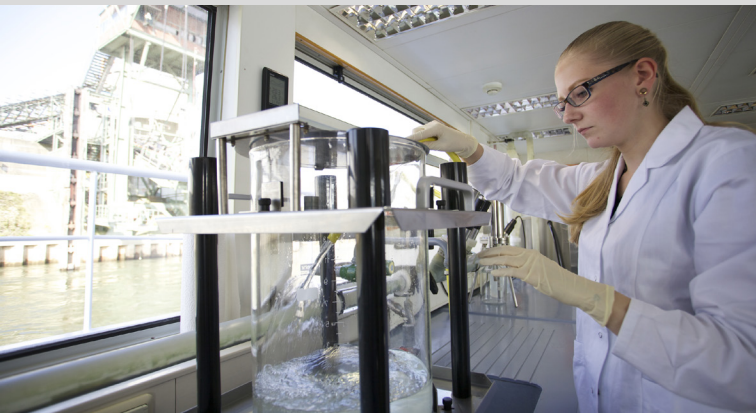


Cross-sectional profile measurements

In larger bodies of water, the water quality at the right and left banks, in the middle of the river, and at different depths is not identical. The mixing in the cross-section of the watercourse depends on currents, the type of substances in the discharge, and water distribution. In order to determine the significance of measurements at on-shore sampling stations, water specimens must be taken and analysed multiple times across the entire river cross-section. This requires the mobility and flexibility of the MAX PRÜSS, given that only such cross-sectional profile measurements allow for reliable calculations of transported pollutant loads.

Special measurement patrols

Special measurement patrols are also carried out, such as temperature measuring programmes as part of the effort to look into global warming water monitoring cruises under the EU Water Framework Directive. MAX PRÜSS is able to take measurements synchronously with the flow. This allows for more accurate statements about changes in water quality, for example along the course of the Rhine.



„The MAX PRÜSS“

The laboratory and sampling vessel is deployed an average of 220 days per year between the Rhine and Weser rivers. It is named after the internationally renowned water management expert and former director of Ruhrverband, Dr-Ing. Max Prüss.

The boat has 27 square metres of laboratory space as well as a 19 square metres multifunctional room, four cabins, and a galley. In addition, the ship has a mess hall and two separate bathrooms with showers and toilets for the crew. The bow resembles the deck of an aircraft carrier to provide the largest possible work surface.

The on-board laboratory is fitted with sampling devices for water, suspended matter, and sediment. A pump down below transports water samples directly from the river to the laboratory. Equipment includes a video microscope camera, as well as a luminescent bacteria test kit for initial assessment of toxic substances in the water. In addition, there is a modern measuring system with sensors for the continuous determination of various parameters such as water temperature, pH value, electrical conductivity, oxygen content, and turbidity. The boat has extra equipment for other types of measurements as well.

The MAX PRÜSS's 340 horsepower diesel engines were retrofitted with a modern combined exhaust gas cleaning system in 2015, making it the first inland vessel in North Rhine-Westphalia to undergo this kind of conversion. This system filters out almost all soot and fine dust, and reduces nitrogen oxides by more than 77 percent. Hydrocarbons and carbon monoxide are also reduced to some extent.

In addition to its technical and scientific tasks, MAX PRÜSS also has an educational role. The large multi-functional room provides specialists with a venue for discussing lessons learnt. The guestbook lists visiting experts from all over the world who were given direct insight of the state of North Rhine-Westphalia's waterways.

General characteristics	
Owner	LANUV NRW
Port of registry	Stadthafen Homberg, Duisburg
Builder	Deutsche Binnenwerften GmbH, Werft Genthin; Building No. 152
Laid down	September 1998
Principal dimensions	
Length overall	33.0 m
Beam	7.57 m
Moulded depth	2.10 m
Draught	1.10 m
Propulsion System	2 diesel engines
Power	2 x 250 kW (340 PS)
Propulsion	conventional
Number of cylinders	6
Rpm	1.800
Cooling system	water cooling
Starter	electric; 24 V, 2-pole
Speed	20 km/h

Landesamt für Natur, Umwelt und Verbraucherschutz
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