



Mercedes-Benz Special Trucks and Mörtlbauer Baumaschinen Vertriebs GmbH jointly presented their two prototypes as part of the WaVe development project to research hydrogen combustion engines for special-purpose vehicles.

IMAGE SOURCE: Daimler Truck AG

Successful development project for hydrogen combustion engines

24 July 2024 by Daimler

- Mercedes-Benz Special Trucks and Mörtlbauer presented two vehicle prototypes with hydrogen combustion engines after a two-year development period.
- The hydrogen combustion engine requires only minor modifications and can be used similarly to diesel engines.
- The "WaVe" project, funded by Germany's Federal Ministry for Economic Affairs and Climate Action, successfully developed these hydrogen combustion engines.

- The Unimog test vehicle and crawler demonstrated their performance in driving, working, and refueling operations.
- The hydrogen combustion engines in these prototypes ensure low emissions while maintaining high power output for driving and auxiliary drives.
- The project involved 18 partners from industry and science, aiming to replace conventional diesel engines with hydrogen-based drive systems.
- **Mercedes-Benz Special Trucks and Mörtlbauer present their two vehicle prototypes with hydrogen combustion engines**
- After two years of development, both vehicles have already been tested in driving, working and refuelling operations
- The hydrogen combustion engine requires only minor modifications and can be used in a similar way to today's diesel engine
- The "WaVe" project to develop two hydrogen combustion engines has been successfully completed
- Franziska Cusumano, Head of Mercedes-Benz Special Trucks: "After numerous test deployments, emission measurements, and technical fine tuning, we are convinced that hydrogen combustion for work machines with high power requirements, both for driving and for powering auxiliary drives, is worthwhile, practical, and very low in emissions."

Mercedes-Benz Special Trucks and Mörtlbauer Baumaschinen Vertriebs GmbH jointly presented their two prototypes as part of the "WaVe" development project to research hydrogen combustion engines for special-purpose vehicles. The Unimog test vehicle and crawler demonstrated their performance in driving and working operation on the Mörtlbauer factory premises in Fürstenzell, Bavaria. The demonstration took place at the end of the project funded by Germany's Federal Ministry for Economic Affairs and Climate Action in which Mercedes-Benz Special Trucks and Mörtlbauer developed two hydrogen combustion engines together with 16 other consortium partners. The drive system has already been in use for over a year for various tests in the Unimog implement carrier. The dump truck crawler was put into operation in spring 2024 and has since also proven itself in initial application-specific tests.



After two years of development, both vehicles have already been tested in driving, working and refuelling operations.

IMAGE SOURCE: Daimler Truck AG

Franziska Cusumano, Head of Mercedes-Benz Special Trucks: "The final event held together with our partner Mörtlbauer on their premises once again demonstrated that both vehicles have reached a development status that we can be very satisfied with, even though this project has run for just three years. After numerous test deployments, emission measurements, and technical fine tuning, we are convinced that hydrogen combustion for work machines with high power requirements, both for driving and for powering auxiliary drives, is worthwhile, practical, and very low in emissions."



Mercedes-Benz Special Trucks and Mörtlbauer Baumaschinen Vertriebs GmbH jointly presented their two prototypes as part of the WaVe development project to research hydrogen combustion engines for special-purpose vehicles.

IMAGE SOURCE: Daimler Truck AG

Armin Mörtlbauer, Managing Director of Mörtlbauer Baumaschinen Vertriebs GmbH: "The fact that our crawler and the Mercedes-Benz Special Trucks Unimog can be easily refueled with gaseous hydrogen and that these vehicles also work reliably when using implements is the result of the outstanding cooperation in this research partnership. We have researched and understood this technology. We now have the corresponding experience and data. However, to apply these in series production, we have to go even further on this path. If the government and society choose to follow the path toward hydrogen combustion engines, we are ready to go."



Mercedes-Benz Special Trucks and Mörtlbauer Baumaschinen Vertriebs GmbH jointly presented their two prototypes as part of the WaVe development project to research hydrogen combustion engines for special-purpose vehicles.

IMAGE SOURCE: Daimler Truck AG

The specially converted Unimog **U 430** implement carrier transported the crawler on a low loader to the event on the Mörtlbauer company premises. After a short drive on its own tracks, the developers then demonstrated the refueling process at a mobile hydrogen refueling station. The Unimog also demonstrated implement operation with a front-mounted sweeper from Schmidt.



Mercedes-Benz Special Trucks and Mörtlbauer Baumaschinen Vertriebs GmbH jointly presented their two prototypes as part of the WaVe development project to research hydrogen combustion engines for special-purpose vehicles.

IMAGE SOURCE: Daimler Truck AG

With vehicles designed for this kind of work, the challenge is ensuring that the respective implement can be operated via a power take-off when driving. This usually requires sustained high power output. Using the two vehicle prototypes as an example, the WaVe project team demonstrated that the hydrogen combustion engine is particularly well-suited for such applications. The propulsion concept of hydrogen combustion ensures low emissions when driving and working while simultaneously ensuring a consistently high engine output.



The Unimog and crawler are equipped with a medium-duty engine that the experts converted especially for hydrogen propulsion. For this purpose, customized pistons, a hydrogen-compatible intake system, and an optimized ignition system were used. Hydrogen combustion in the engine compartment of the Unimog and crawler produces water, which is discharged as hot steam via the exhaust system.

IMAGE SOURCE: Daimler Truck AG

Under the hood of the prototype vehicles

The Unimog and crawler are equipped with a medium-duty engine that the experts converted especially for hydrogen propulsion. For this purpose, customized pistons, a hydrogen-compatible intake system, and an optimized ignition system were used. Hydrogen combustion in the engine compartment of the Unimog and crawler produces water, which is discharged as hot steam via the exhaust system.



The Unimog and crawler are equipped with a medium-duty engine that the experts converted especially for hydrogen propulsion.

For this purpose, customized pistons, a hydrogen-compatible intake system, and an optimized ignition system were used. Hydrogen combustion in the engine compartment of the Unimog and crawler produces water, which is discharged as hot steam via the exhaust system.

IMAGE SOURCE: Daimler Truck AG

On the Unimog, the four TÜV-certified, 700 bar high-pressure tanks hold around 13 kilograms of gaseous hydrogen in total. The engine delivers around 290 hp / 1000 Nm, making it comparable with a 300 hp diesel variant in terms of output and torque. The prototype was operated with several different attachments in order to incorporate insight from real-life use directly into development.



The Unimog and crawler are equipped with a medium-duty engine that the experts converted especially for hydrogen propulsion. For this purpose, customized pistons, a hydrogen-compatible intake system, and an optimized ignition system were used. Hydrogen combustion in the engine compartment of the Unimog and crawler produces water, which is discharged as hot steam via the exhaust system.

IMAGE SOURCE: Daimler Truck AG

The crawler dumper achieves similar values with its hydrogen combustion engine: The engine output is almost identical, and the fuel tank holds 14.5 kilograms of hydrogen at 700 bar. The crawler has a bed capacity of 16 cubic meters and can carry a payload of 30 metric tonnes. With its dozer blade and 360-degree rotating body, this crawler can be used flexibly to transport loose bulk material.



The specially converted Unimog U 430 implement carrier transported the crawler on a low loader to the event on the Mörtlbauer company premises.

IMAGE SOURCE: Daimler Truck AG

The “WaVe” development project

The test vehicle with a hydrogen combustion engine was developed as part of the publicly funded “WaVe” project. The project, funded by Germany's Federal Ministry for Economic Affairs and Climate Action, was jointly realized by 18 partners from industry and science and started in July 2021. After a year of planning and preparations, development work on the prototypes began in mid-2022. The objective of the WaVe project was to develop a hydrogen-based drive system for working machines and thus replace the conventional diesel engine. It was shown that hydrogen-powered vehicles and working machines can be used in very similar ways to the current diesel engine with only minor modifications to the drivetrain components.



After two years of development, both vehicles have already been tested in driving, working and refuelling operations.

IMAGE SOURCE: Daimler Truck AG

Source: Daimler Truck AG

TRUCKS