



The MONOCAB

Abstract — The MONOCAB is a compact, autonomous monorail vehicle. In contrast to other so-called "monorail" vehicles, it stabilizes itself on a single conventional rail without mechanical support. A narrow vehicle body allows a simultaneous operation in both directions on single-track lines. Therefore, MONOCABs can be used to implement very innovative rail-based mobility concepts with "service-on-demand" as an attractive alternative to conventional solutions, especially for reactivating disused railway lines in rural areas.

I. INTRODUCCION

The project MONOCAB-OWL was initiated by the participating stakeholders to create an innovative vehicle concept for sustainable mobility in rural areas. Currently, there are hardly any attractive, effective and at the same time ecologically and economically viable solutions for sparsely populated areas as an alternative to the private car. The reactivation of disused railway lines is not yet a comprehensive solution, but it is a sensible contribution because the infrastructure already exists. Flexible rail-based mobility concepts with "service-on-demand" on reactivated lines could provide a connection to transport hubs in medium-sized centers and thus form the backbone of a multimodal mobility concept in rural areas in the future. The main advantage is the higher flexibility compared to classic timetable-based rail transport to create an attractive offer for users within the framework of a digital mobility booking and guidance system.

For this purpose, various concepts for small, autonomously running rail vehicles are currently being discussed [1] which combine the advantage of the low rolling resistance of rail vehicles with high flexibility and low costs for infrastructure and operation. The MONOCAB is the only known technical concept that enables continuous and independent operation in both directions on single-track lines without oncoming vehicles competing with each other in terms of space and time.

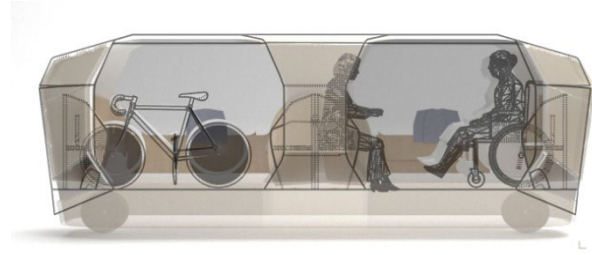
The MONOCAB is designed to be equally suitable for families, pupils, students, commuters, senior citizens and tourists. It can transport up to 6 adults and is barrier-free so that wheelchairs, prams and bicycles can be taken along. In addition to reactivating old railway lines, the MONOCAB is also intended for innovative urban or campus railway concepts.

II. PROJECT MONOCAB - OWL

The basic technical feasibility of monorail vehicles is out of question, since a first vehicle was already realized and successfully tested in 1906 by Louis Brennan [2].

However, it is unclear how such vehicles can be realized with modern methods and components in such a way that the vehicle is safe and meets the previous described application scenarios.

In the project MONOCAB-OWL, a vehicle concept is developed which comprise an effective and safe technical



Picture 1: MONOCAB-Cabin

implementation as well as a vehicle design that corresponds to the planned user scenarios. For this purpose, two MONOCAB test vehicles will be developed, built and tested. The MONOCAB-OWL project started in autumn 2020 and is expected to be completed by the end of 2022 with the testing of the demonstration vehicles.

The vehicles already have the targeted size, can run on a normal track and be occupied by people. However, they do not yet correspond to a vehicle for series use. For the series vehicles, a later development is necessary in which the degree of integration and design of the subsystems will be increased and optimized with regard to production and maintenance to reduce the costs and increase the energy efficiency and functional safety. However, the construction of the demonstration vehicles on a scale of 1:1 is crucial for the progress of the project, as this is the only way to develop real construction space concepts and test realistic dimensions of technical components.

The construction and first tests of the vehicles will take place in Dörentrup on an historic single-track railway line between Lemgo and Extertal in North Rhine-Westphalia (Germany). This is one of the tracks, which could be reactivated in the future. Passengers could then book their MONOCAB for individual travel. This idea was awarded with the German Mobility Award 2018, [3].

III. PROJECT PARTICIPANTS AND FOUNDING

MONOCAB-OWL is a joint project of the Ostwestfalen-Lippe University of Applied Sciences and Arts, the Bielefeld University of Applied Sciences, the Fraunhofer IOSB-INA and the Landeseisenbahn Lippe (e. V.). The consortium is supported by the district of Lippe, the Extertal transport authority, OWL GmbH, VVOWL and NWL as well as numerous regional and national companies. The project is part of Regionale 2022 and is funded by the European Regional Development Fund (ERDF) and the Ministry for Transport of the state of North-Rhine Westphalia (Germany).

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