

EM1373/ET3373 known as a Super Ganz has been donated to the National Railway Museum at Ferrymead, Christchurch. During their 34 years of service the Ganz Mavag units operated on all the Wellington suburban routes except the Johnsonville line which continued to use with the English Electric DM/D EMUs built between 1946 & 1954 until the arrival of the Matangi EMUs in 2011.

*Robert Sweet*

## EUROPE

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#### Driverless Austrian veteran electric railcar on test

In 2008 Stern & Hafferl Verkehrsgesellschaft and Universität Salzburg Fachbereich für Computerwissenschaften, with FH Oberösterreich acting as project coordinator, started to develop a project, then entitled autoBAHN, aimed at the radical reshaping of the way local rural rail services are operated. In 2015 the project was given a name - autoBAHN2020. This was led by FH Oberösterreich, working together with Stern & Hafferl, the Austrian Institute of Technology, Siemens Österreich, ZT Fischer and Geospy.

The promoters of the scheme stated as their aim the offering of a commercially feasible service of at least two trains per hour, or even on demand during off-peak periods, on essentially rural lines. They envisaged the use of small, lightweight vehicles, operating at higher frequencies than conventional trains, and making use of telemetry and radio data transmission to enable driverless operation.

Safety was taken into account – ensuring that brakes would be applied if obstacles were encountered on the track. However it was practically impossible to cover all possible hazard scenarios, so a strategy of ALARP (As Low As Reasonably Practicable) was adopted to minimise residual risk. It was asserted that the actual ALARP strategy to be followed would, of course, vary according to the individual characteristics of each stretch of railway involved.

For the test runs Stern & Hafferl's ET23 112 electric railcar was used. This was built by SWS (Schweizerische Wagons- und Aufzügefabrik AG, Schlieren-Zürich) in 1954 as Be 4/4 8 for the Wynental- und Suhrentalbahn and has a power rating of 376 kW. Its front end was fitted with three video cameras, two infrared cameras, two radar sensors and close-range ultrasonic sensors, to enable it to 'see' the line ahead. So that it 'knew' where it was, it was equipped with GNSS (Global Navigation Satellite System), RFID (Radio Frequency Identification) balises, a gyroscope, an accelerometer and a digital route map.

The first driverless test run using ET23 112 was made on 14 April 2018 between Vorchdorf and Gmunden (14.7 km) on the metre gauge Traunseebahn. End-to-end journey time was about 25 minutes (regular services take 27 minutes) and several (but not all) station stops were made.

More test runs are planned for summer 2018. The project team has realised a detailed profitability analysis of autoBAHN2020 implementation and reckons that it is economically feasible.

As part of the project the autoBAHN2020 team conducted a questionnaire survey of around 1,500 passengers, to evaluate their attitudes towards automatic train operation. Preliminary indications are that the concept was acceptable, though some people were concerned about aspects of safety and personal assistance. The detailed results of this survey are to be published in the near future.

*Mike Bent*

ET23 112 at Kirchham during the test run.  
*Christa R Holzinger*

