Flywheel energy storage switzerland

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A gyrobus is an electric bus that uses flywheel energy storage, not overhead wires like a trolleybus. The name comes from the Greek language term for flywheel, gyros. While there are no gyrobuses currently in use commercially, development in this area continues.

The concept of a flywheel-powered bus was developed and brought to fruition during the 1940s by Oerlikon (of Switzerland), with the intention of creating an alternative to trolleybuses for quieter, lower-frequency routes, where full overhead-wire electrification could not be justified.

Fully charged, a gyrobus could typically travel as far as 6 km (3.7 mi) on a level route at speeds of up to 50 to 60 km/h (31 to 37 mph), depending on the total weight of passengers, as top speeds varied as passenger levels varied from stop to stop. The installation in Yverdon-les-Bains (Switzerland) sometimes saw vehicles needing to travel as far as 10 km (6.2 mi) on one charge, although it is not known how well they performed towards the upper end of that distance.

Charging a flywheel took between 30 seconds and 3 minutes; in an effort to reduce the charge time, the supply voltage was increased from 380 volts to 500 volts. Given the relatively restricted range between charges, it is likely that several charging stops would have been required on longer routes, or in dense urban traffic. It is not clear whether vehicles that require such frequent delays would have been practical and/or suitable for modern-day service applications.

The demonstrator was first displayed (and used) publicly in summer 1950 and, to promote the system, this vehicle continued to be used for short periods of public service in myriad locations at least until 1954.

In 1979, General Electric was awarded a $5 million four-year contract by the United States government, the Department of Energy and the Department of Transportation, to develop a prototype flywheel bus.[2]

In the 1980s, Volvo briefly experimented with using flywheels charged by a small diesel engine and recharged via braking energy. This was eventually dumped in favour of using hydraulic accumulators.

During the 1990s, the Dutch Centre for Concepts in Mechatronics had developed a flywheel for both mobile and stationary applications.[3]

In 2005, the Center for Transportation and the Environment, working with the University of Texas at Austin, Center for Electromechanics, Test Devices, Inc., and DRS Technologies sought funding for the development of a prototype gyrobus.[4]

The first full commercial service began in October 1953, linking the Swiss communities of Yverdon-les-Bains and Grandson. However, this was a route with limited traffic potential, and although technically successful it was not commercially viable. Services ended in late October 1960, and neither of the two vehicles (nor the demonstrator) survived.

The third location to use gyrobuses commercially was Ghent, Belgium. Three gyrobuses started operation in late summer 1956 on a route linking Ghent and Merelbeke. The flywheel was in the center of the bus, spanning almost the whole width of the vehicle, and having a vertical axis of rotation. The Ghent to Merelbeke route was intended to be the first of a proposed multi-route network; instead, its gyrobuses stayed in service for only three years, being withdrawn late autumn 1959. The operator considered them unreliable, "spending more time off the road than on", and that their weight damaged road surfaces. They were also considered to be energy hungry, consuming 2.9 kWh/km—compared with between 2.0 kWh/km and 2.4 kWh/km for trams with much greater capacity.

One of Ghent"s gyrobuses has been preserved and restored, and is displayed at the VlaTAM-museum in Antwerp. It is sometimes shown (and used to carry passengers) at Belgian exhibitions, transport enthusiasts" bazaars, etc. The tram depot in Merelbeke has been closed since 1998, but it still stands, as it is protected by the law.