

Beer Delivery by Feldschlösschen with Electric Trucks

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Abstract

Feldschlösschen Getränke Ltd (FGG), the most important Swiss brewery, tested a light electric truck by Modec (UK) for the delivery in cities. The good driving characteristics, low energy consumption, emissions that are almost negligible and the small turning radius confirm the excellent suitability of the Modec in the agglomeration traffic. Based on the results of this field test, Feldschlösschen decided in December 2008 to order 12 – 15 Modecs more.

Keywords: city traffic, cost, demonstration, energy consumption, goods delivery

1 Introduction

In the framework of the acquisition of new utility vehicles Feldschlösschen Getränke Ltd. (FGG), the most important brewery in Switzerland, wants to test light trucks with alternative propulsion for its fine distribution. Starting in July 2008, an intensive field test was undertaken with a light electric truck by Modec (UK), imported and maintained by Volvo Trucks (Switzerland) Ltd.

The trials are conducted in two phases. The results of the first phase served as a base for a decision of Feldschlösschen for another vehicle order in fall 2008. In a follow-up-operation during winter indications for any adjustments to the vehicles and distribution concept are expected.

Given the importance of road transport for traffic, energy and environmental policy in general and the immense potential of electric vehicles in city traffic in particular this project is of high public interest and it is therefore supported by the Swiss Federal Office of Energy (SFOE).

2 Objective of the field test

The evaluation of the pilot project serves the following objectives:

- Performance tests of the electric utilities of Modec and Smith in view of the requirements of FGG
- Indications for further development of the tested electric vehicles
- Basis for decision-making for the management of FGG to acquire additional vehicles
- Lessons to be learned by Volvo Trucks (Switzerland) Ltd. for the distribution of electric utility vehicles in Switzerland
- Examination of the political framework and any arguments for the political support of electric utility vehicles
- Basis for communication (media, other potential users of electric utilities)

The evaluation layout covers the following topics:

- Performance: energy consumption, range, emissions, acceleration performance, ergonomics, etc.
- Reliability: systematic and random breakdowns
- Safety

- Cost
- Potential use for FGG: in the test cities, throughout Switzerland
- Vehicle deficiencies / optimizations
- Reactions of third parties: FGG customers, potential buyers of electric utility vehicles, politicians, power suppliers, passers-by

3 Methods

The following list gives an overview of the intended methods:

- Analysis of previous experience with electric utilities of Modec and Smith
- Driving performance during the pilot operation: tachographs, electric meters, daily reports
- Measurement of standard consumption according NEDC on the roller dynamometer of the Bern University of Applied Science in Biel.
- Test drive: acceleration, brakes, vehicle ergonomics, agility, etc.
- Focus discussions with drivers
- Evaluation of breakdowns
- Total cost assessment
- Potential assessment for the test cities and for the whole of Switzerland
- Feedbacks from customers, potential buyers of electric utilities, politicians and passers-by
- Media evaluation

4 The Light Electric Truck Modec

The light electric truck Modec is based on a purpose built vehicle concept developed by Modec.



Figure1: The Modec in the Feldschlösschen version

Its main specifications are as follows:

Motor: Maximal Power: 102 PS
Regenerative Braking
Maximale Torque: 300 NM
Maximal speed: 80 km/h
No Gears
Battery: Lithium Iron Phosphate (LiFePO₄, Axion Power UK), 51.2 kWh
Range: 100 km
Charger: 7,68 kW, external
Charging time: 8 hours
Weight: Gross weight 5'490 kg
Pay load: 2'650 kg

The Modec is already in service at some delivery companies in UK. While those vehicles were equipped with NaNiS batteries by MES-DEA (Zebra), the Feldschlösschen version was the first one with a Lithium battery technology.

For more details see [1].

5 Results of the Field Test

The results of the first phase of the field test (summer 2008) are described in a report [2].

The most important results are as follows:

The light electric truck Modec has proven to be quite reliable. However, the level of modern standard diesel trucks could not be met yet. Some breakdowns such as a wrong indication of the state of charge (twice) or a failure of the heating system could be repaired.

In a three-week test operation in daily use in Berne the Modec covered a total of 565 km which is 40 km per day on average. The energy consumption was 62 kWh / 100 km on average what corresponds to a diesel equivalent of about 5.6 litres / 100 km. This is 66 % less than the average consumption of the actual Feldschlösschen fleet (Renault Mascott, 16.6 litres / 100 km).

The range of 80 - 100 km with one battery charge, which was achieved in the field test, corresponds quite well to the figures indicated by the manufacturer (100 km with the Li-Ion battery).

The average speed was 19.7 km / h. This figure corresponds to the urban stop-and-go traffic. In overland traffic the Modec with the maximum speed of 80 km / h and thanks to its good acceleration capabilities could easily keep pace.

All Modec drivers were basically satisfied and they can well imagine to drive the vehicle permanently. Especially appreciated was the entrance through the back door of the cab. This is more convenient than the sideward entrance. The drivers obviously enjoy it to do contribute to a better environment while working without any restrictions. The many positive reactions from customers and passers-by reassure them. On the other hand, the drivers claimed the following disadvantages:

- The opening part of the side window is too low (especially for tall drivers).
- The lining of the wheelhouse complicates the mounting of snow chains, especially when the vehicle is loaded.

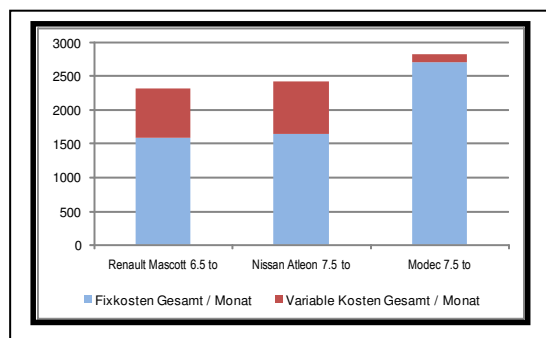


Figure 2: fix cost and variable cost of the Modec and two comparable diesel trucks

The total cost – based on a 4 years leasing - is 21 % more than the actual truck of Feldschlösschen (Renault Mascott) and 16 % more than for a comparable future diesel Truck (Nissan Atleon). The service and maintenance cost, which is considerably lower for the Modec, cannot compensate the high purchase price.

The Modec got a high interest by the media. So far there were 26 articles in newspapers and specialised media covering the trials with over half of them with a photo of the vehicle.

In the winter tests in February/March 2009, the Modec run 738 km. The average consumption increased from 62 to 90 kWh / 100 km. Consequently the range with one battery charge decreased by more than 30 %.

The reliability in temperatures below 0 C° was quite satisfying, except the heating. First it took two months until it worked, then the performance

wasn't sufficient to keep the big cabin warm and the large windows dry.

6 Conclusions

The good driving characteristics, low energy consumption, emissions that are almost negligible and the small turning radius confirm the excellent suitability of the Modec in the agglomeration traffic.

The energy consumption in daily use was only 34 % of the one of the actual diesel truck.

The Modec was highly appreciated by the driver crew.

The interest of the Feldschlösschen customers, the passers-by as well as by the media was high.

Based on the results of this field test, Feldschlösschen decided in December 2008 to order 12 – 15 Modecs more.

In cold winter time, the range decreased significantly. For Feldschlösschen, the Modec should be equipped with a bigger battery offering a higher range.

References

- [1] www.modcezev.com
- [2] Urs Schwegler: Schlussbericht zur 1. Phase des Feldtests; Bern, 19. Januar 2009
- [3] Urs Schwegler: Ergebnisse des Wintertests; Bern, 18. April 2009

Author



Urs Schwegler (55) studied transportation engineer at the Swiss Federal Technical High School at Zurich. As a project manager with e'mobile, he is leading several projects on market introduction of electric vehicles. Urs Schwegler participated in several research and demonstration projects of the EU and the IEA.