



ZF Equips Fuel Cell Bus with Electric Drive System

- **First application of ZF's AxTrax AVE electric portal axle in a fuel cell configuration by ADL**
- **ZF delivers system solution for optimal performance**
- **New prototype bus performs impressively during field testing**

Friedrichshafen/Larbert, Scotland. The British bus manufacturer Alexander Dennis Ltd. (ADL) is expanding its product line, adding a double-decker model powered by a fuel cell drive. This new model is also equipped with ZF's AxTrax AVE electric drive axle to prevent local emissions. ZF also provided additional hardware and software solutions for optimum performance. An initial prototype was impressive, operating at high efficiency during field testing.

The successful AxTrax AVE electric portal axle product line goes from strength to strength. "We are delighted that the British manufacturer Alexander Dennis has placed its trust in the AxTrax AVE electric drive solution from ZF," says Fredrik Staedtler, head of ZF's Commercial Vehicle Technology Division. "ZF has simplified the process of electrifying vehicle platforms for the manufacturer while making an important contribution toward keeping city center mobility solutions free from emissions."

The AxTrax AVE will be installed in a bus with a fuel cell drive. The bus, designed by ADL, is based on its Enviro400 product line. This configuration comprises a secure system that uses hydrogen to generate electricity, which, in turn, drives two electric wheel-hub motors in the electric portal axle. As fuel cells do not utilize fossil fuels, they produce no hazardous emissions, only steam.

Partner in the system

ADL spent two years developing this hydrogen-driven double-decker bus with ZF selected as a partner right from the start. During field testing, the prototype operated along real bus routes in several cities throughout the United Kingdom. The Enviro400 design impressed everyone with its outstanding efficiency.



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In addition to the AxTrax AVE, ZF also provided the inverter, the EST 54 electronic control unit and the appropriate control software. In this complete system, the company optimally aligned performance, efficiency and the service life of the drive. Moreover, this system solution helped reduce the test and homologation costs for ADL. The British manufacturer has already presented the prototype of the new fuel cell double-decker to the public as well as several fleet operators.

Efficient and proven

The AxTrax AVE was introduced for the first time in 2012 and has been successfully deployed around the world ever since. The electric drive axle can be used in a wide array of possible applications as it can not only be operated in the mentioned fuel cell configuration, but also as a hybrid or purely electrically with lithium-ion batteries. In addition to the striking drive performance – totaling 250 kW up to a maximum axle load of 13,000 kilograms – the compact design is also appealing. Since neither a conventional unit nor a universally jointed shaft is necessary for transmitting power, manufacturers now have more freedom to design the passenger area the way they want. They can add seating and standing room, for example, or provide for step-less entry and exit or a completely flat passageway.

Captions:

- 1) The prototype of the new fuel cell bus from ADL is based on the Enviro400 model and performed impressively in field testing with outstanding efficiency.
- 2) Powerful and environmentally friendly, ZF's AxTrax AVE electric drive axle drives low-floor buses up to a maximum axle load of 13,000 kilograms. The electric motors integrated into the wheel heads have a total output of 250 kilowatts.

Photos: ADL, Andrew Macintosh (1), ZF (2)



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ZF Friedrichshafen AG

ZF is a global leader in driveline and chassis technology as well as active and passive safety technology. The company has a global workforce of 146,000 with approximately 230 locations in some 40 countries. In 2017, ZF achieved sales of €36.4 billion. ZF is one of the largest automotive suppliers worldwide.

ZF allows vehicles to see, think and act. The company invests more than six percent of its sales in research and development annually – in particular for the development of efficient and electric drivelines and also in striving for a world without accidents. With its broad portfolio, ZF is advancing mobility and services in the automobile, truck and industrial technology sectors.

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