



Faster and More Flexible: BRT With Low-Floor Buses

- **Bus Rapid Transit system with ZF technology manages urban transport flexibly and at low costs.**
- **Lower costs for infrastructure compensate for additional expenses for more advanced buses.**
- **Planning and construction time considerably shorter than for platform solution.**

Metropolises like Beijing are growing fast. Traffic jams and smog are the order of the day. For two years now, traffic planners in Beijing have therefore been using Bus Rapid Transit, abbreviated BRT – a traffic concept based on low-floor buses equipped with ZF technology. The benefits: shorter implementation times, less space requirements at bus stops, more flexibility. And often, this goes hand in hand with lower total costs - compared to systems with platform bus stops. All of the abovementioned are advantages which also many other megacities, such as Istanbul, Teheran, Seoul, Santiago, Barquisimeto, and Sao Paulo have been convinced of.

Quick exit and entry of passengers for small investment

The use of low-floor buses enables – as the name already suggests – level access for getting on and off the bus, also known as ‘level boarding’. The passengers can move through the bus quickly via the central corridor which is also free from platforms and steps. Thus, in Beijing, it is possible to achieve dwell times at bus stops of only approx. 16 seconds. In combination with extra bus lanes on the roads, the low-floor articulated buses, 90 in total, can serve the 16 kilometer long North-South line in Beijing with 17 bus stops in a 3-minute cycle, during the rush hour even in a 50-second interval. This way, up to 160,000 passengers per day and up to 8,000 per hour and direction of travel are transported.

In addition, lead times for planning and construction work are very short and investment costs are comparatively low. For



example, line service in China's capital was put into operation after only 25 months of preparation.. Time effort and expenses were rather low, mainly because it was not necessary to plan and build space-intensive platform bus stops.

ZF Driveline and Chassis Technology

ZF provides bus manufacturers worldwide with the technology for these low-floor buses: Mercedes-Benz, Setra, MAN, Neoplan, Scania, Volvo, and many others are banking on ZF's low-floor axle systems, just like King Long, Dongfeng, Huanghai, and Yutong. For the front axle, ZF offers two axle systems: the RL 85 A front axle with rigid axle support which excels by its robustness and maintainability, and the RL 75 EC low-floor independent wheel suspension with high steering angle for increased maneuverability. The latter is particularly suitable for longer double-articulated buses as it considerably increases running, steering, and driving comfort as well as driving safety. Unsprung mass is reduced and compression travels are extended. High roll stiffness improves handling and maneuverability which is indispensable for buses with a length of up to 25 meters. However, it is the special design of the ZF-AV 132 portal axle which makes low-floor technology possible also for the drive axle and consequently, for the entire vehicle. The floor height of only 405 millimeters allows for stepless boarding also with a third door behind the drive axle. The non-driven AVN 132 portal axle is particularly suited as central axle in articulated buses with a length of up to 25 meters. The package is completed by the Servocom steering system which convinces by high comfort and great handling. It is easy to steer and features small steering wheel turns and small installation dimensions.

Perfectly complemented

At the driveline-end, the "Bus Rapid Transit" system is ideally complemented by the Ecomat 4. The automatic 6-speed transmission scores with good tractive power and maximum speed with a more slowly working engine and use of a torque converter. This leads to optimized driving characteristics and efficiency, so it saves a considerable amount of fuel and emissions. With the



"Neutral Bus Stop" function (abbreviated: NBS) fuel consumption can be further reduced.

Moreover, the Ecomat 4 with its six gears is optimally adjusted to frequent starting processes in city bus operation, leading to relief for the driver and increased comfort for the passengers in crowded buses thanks to smooth setting off at bus stops. A special torsional vibration damper not only brings about further fuel savings but also preserves the driveline, thereby increasing the entire transmission's service life. Moreover, the torsional vibration damper contributes to the minimization of vibrations. The use of Ecofluid A plus, the ZF transmission fluid which has been adjusted to special temperature requirements, additionally reduces the number of maintenance intervals: Thus, oil change becomes necessary only every 120,000 kilometers and the general transmission service life is extended.

Captions:

- 1.) Bus Rapid Transit (BRT) plays off the advantages of the bus as a means of transport in metropolises: A large number of persons can be transported quickly and efficiently, there is no more traffic congestion, and CO₂ emissions are reduced. Low-floor technology by ZF enables passengers to get on and off the bus quickly, an essential feature of this traffic concept.
- 2.) High steering angle: The RL 75 EC low-floor independent wheel suspension for better handling, particularly for double-articulated buses. Furthermore, it improves running, steering and driving comfort and increases driving safety.
- 3.) Robust and easy-to-maintain: The RL 85 A front axle with rigid axle support is also suitable as actively or passively controlled trailing axle for 3-axle city buses.
- 4.) Entry made easy: The ZF AV 132 portal axle allows for a consistent low-floor design in the entire vehicle with a floor height of just 405 millimeters.



5.) Pas de deux: As central axle in articulated buses of up to 25 meters length, the non-driven AVN 132 portal axle is the perfect complement to the AV 132.

Photos: ZF

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ZF is one of the world's leading automotive industry suppliers specializing in driveline and chassis technologies. With a workforce of 63,000 employees, the company operates 125 plants in 26 countries. To sustain its success with innovative products, ZF invests at least 5 percent of its annual revenues (about €700 million from an annual total of €12.5 billion in 2008) in research and development.

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