

The State of New Jersey is located on the Atlantic coast and in the northeastern part of the U.S. Across the Hudson River, its eastern border, is the State of New York. New Jersey has a long history: it is one of the first states which joined the fight to win independence from Britain. Throughout the turbulent history of America, the state has always played an important role; for example, it served as a driving force in the Industrial Revolution in the 19th century. Also, many pioneering efforts were made in this area to develop means of transporting industrial and agricultural products to consuming areas. Furthermore, the state produced Robert Stevens, the engineer who invented and commercialized flat-bottom T-shaped rails that are commonly used today.

Outline of the Lines and the Contract

Kinki Sharyo delivers LRVs to NJT, an organization that operates and manages main public transports in the New Jersey area. After the placement of an order in 1996, 45 units were delivered in 2000, and an additional 28 in 2004 (which add up to a total of 73 units). These vehicles are operated on the New Ark Line (a conventional line with an operating extension of about 10 km) and the Hudson-Bergen Line (a new line with an operating extension of about 25 km).

The New Ark Line links New Ark Station (an Amtrak station) and a commuter town to the north. After inauguration in 1935, the Line operated traditional PCC cars for a long time, until they were replaced by cutting-edge LRVs in a feat of technological innovation in one breath. The Line has 12 stations, and it takes about 20 minutes to trip from one end of it to the other (with a car stopping at every station).

The Hudson-Bergen Line was newly developed along the Hudson River flowing on the east side of the state border. The Line was inaugurated in March 2000. It is designed for “park and ride”-style transportation, and provides an easy access from a suburban commuter town to an office district, contributing to the mitigation of traffic congestion and the improvement of the environment.

Recently, the Line was linked to an existing PATH (Port Authority Trans-Hudson Corp.) railway line that runs from New Jersey through an underground section beneath the Hudson River, and accesses the midtown and downtown of Manhattan. Thanks to this linkage, the time required for commuting to Manhattan has been reduced substantially. During a trip on the line, passengers can enjoy a wonderful view of Manhattan and the Statue of Liberty. Trains are

operated at intervals of 15 minutes from 5:30 a.m. to 2:00 a.m.; a train consisting of two coupled units is used during rush hours in the morning and the evening. The line has 24 stations, and it takes about 50 minutes to trip from one end of it to the other (with a car stopping at every station).

The contract for the Hudson-Bergen Line was a special one called DBOM (Design, Build, Operate, Maintain), based on which Kinki Sharyo and Raytheon (an American firm that has been reorganized into Washington Group) contracted a comprehensive range of services comprising the construction and maintenance of railway facilities and repair shops, the management of operation, and the manufacture and maintenance of vehicles. Kinki Sharyo is responsible for vehicle manufacture and maintenance.

As it was the first experience for Kinki Sharyo to contract vehicle maintenance, we had to start from scratch to secure and train personnel, and establish a suitable organization. Workers were locally hired, and received basic education and training in vehicle construction and assembly through such FA works as interior assembly, wiring, connector and terminal connection, and equipment installation. Also, they received maintenance education provided by equipment manufacturers; and finished all preparations, including the preparation of maintenance manuals, in a period of time as short as about 18 months.

Vehicle Characteristics

Steel bodies are used for the vehicles. Low-VOC urethane paints are used for the painting of outer plates to provide a uniform color scheme for NJT. The vehicles have a flat appearance thanks to fixed windows, swing plug type doors, skirts installed on body sides, and large shrouds covering the sides of rooftop equipment. A unit consists of three bodies (two end bodies and one middle body) joined with couplers. It also includes three bogies: one M bogie each for end bodies, and one T bogie for the middle body.

To meet demands from wheelchair users and the handicapped for easier movements, a low-floor construction is used, with 70% of a passenger car area removed 350 mm from the rail surface. Accordingly, such equipment as the main control unit, the auxiliary power supply and batteries have a compact design for installation on the roof.

A Z-link mechanism and a yaw damper are installed on the rooftop to reduce pitching and rolling at couplings. Thanks to these features, the vehicles run at a maximum speed of 90 km/h and a minimum speed of 18 mR without much jolting.

To ensure the safety of passengers and personnel at a

crash, the vehicle is provided with a mechanism to absorb impact energy in the front frame.

The vehicle is equipped with regenerative brake equipment. Also, each bogie is provided with an electrically controlled hydraulic brake for ordinary use and a track brake for emergency use. These features contribute to enhancing the reliability of braking.

For air conditioning, the vehicle is equipped with HVAC (automatic equipment for cooling, heating and ventilation) and a floor heater on the carriage sidewall. This equipment is controlled with an indoor sensor for passenger comfort at all times.

To allow the operator to check the safety of passengers in one-man operation, CCTV cameras are installed on the body exterior for monitoring from the cab seat.

moved their offices from Manhattan to New Jersey, contributing to the increase of users of the Hudson-Bergen Line year by year.



Operation Characteristics

The operation of the Hudson-Bergen Line is based on a "trust system," which means that there is no ticket barrier in a station. The fare is fixed at 1.9 dollars for a one-way ticket (with discounts provided in the form of a book of tickets, commuter tickets etc.). Tickets are sold by the ticket-vending machine on a platform. Before boarding a train, a passenger must have the present time stamped on his/her ticket with an automatic stamp attached to the vending machine. A ticket is valid for 90 minutes from the time stamped on it; a passenger may board or exit a train for any number of times within this 90-minute period. Railway sheriffs board a train from time to time to examine tickets. A passenger caught stealing a ride must pay a fine of up to 100 dollars.

On September 11, 2001, one year after the inauguration of the Line, America was hit by terrorist attacks. As the terminal of the PATH downtown line was WTC (World Trade Center), authorities gave train operators an emergency order to transport injured people using the line to save their life. Operators of the Hudson-Bergen Line, linked to the PATH line, also made emergency rescue vehicles ready by removing all seats from carriages. However, they were mortified to know that they could save no lives, because the underground WTC station and the tunnel section close to it had been destroyed completely, and thus become unapproachable. After the terrorist attacks, many firms