Type HD300 Shunting Locomotive with Diesel Hybrid System

Type HD300 shunting locomotive with diesel hybrid system

The type HD300 shunting locomotive currently under development for Japan Freight Railway Company employs a series hybrid system that uses a diesel power generator and rechargeable battery with the aim of reducing the load on the environment.

In March 2010, Toshiba completed the development of a prototype locomotive incorporating a totally enclosed self-ventilated permanent magnet synchronous motor (PMSM) with high efficiency and maintainability, a compact diesel engine with low exhaust gas emissions, and optimal equipment for shunting operations.

The prototype locomotive is currently undergoing various types of performance tests at a freight terminal of Japan Freight Railway Company, to compare this system with existing diesel locomotives in terms of reductions in fuel consumption and exhaust gas emissions.

The development work and performance evaluations are being carried out with the support of the Ministry of Land, Infrastructure, Transport and Tourism, Japan.

PMSM Propulsion System for 16000 Series EMUs of Tokyo Metro Co., Ltd.

Toshiba has delivered the permanent magnet synchronous motor (PMSM) propulsion system for the 16000 series electric multiple units (EMUs) of the Chiyoda Line operated by Tokyo Metro Co., Ltd.

This system employs a permanent magnet for the rotor of the traction motor, achieving higher efficiency compared with the conventional induction motor (IM). This is the first time(*) that a Cardan type 1 500 V catenary PMSM system has been adopted for mass-produced EMUs in Japan. Lower generation of heat by a PMSM compared with an IM makes a totally enclosed structure possible, leading to lower noise and reduced maintenance.

The variable-voltage variable-frequency (VVVF) inverter can cut out individual motors without degrading the performance of the system, permitting reductions in the number of motors for each formation.

Commercial operation of this system started on November 4, 2010. From now on, we will evaluate the energy-saving effect of the system.

(*) As of November 2010 for the Cardan type (as researched by Toshiba)

PMSM

16000 series EMU for Tokyo Metro Co., Ltd.

VVVF inverter

Equipment for 225 Series DC EMU Developed and Delivered

West Japan Railway Company and Toshiba have developed and delivered electrical equipment including a VVVF inverter/static inverter (SIV) system and a digital communication system for West Japan Railway Company's 225 series DC electric multiple unit (EMU).

The new VVVF inverter was developed based on the VVVF inverter for the 321 series DC EMU in consideration of coupling the 225 series to the existing 223 series DC EMUs. When the newly developed VVVF inverter receives a signal indicating coupling from the digital communication system, it selects the software that will provide the most comfortable ride.

We have also developed a remote loading function for the electrical equipment in order to minimize equipment installation time. This function makes it possible to write program data stored in an integrated circuit (IC) card into the equipment by operating a monitor device in the vehicle cab.

Commercial operation of the 225 series DC EMU started in December 2010.

(a) VVVF inverter/SIV system

(b) Monitor display of remote loading function in vehicle cab

(c) 225 series DC EMU of West Japan Railway Company

Equipment for 225 series DC EMU of West Japan Railway Company

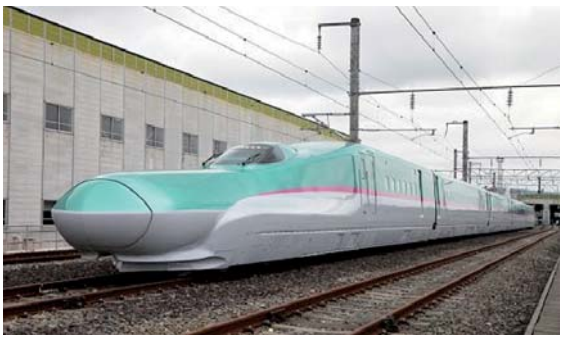
Propulsion System for Prototype E5 Series Shinkansen of East Japan Railway Company

Main converter equipment

Toshiba has developed the propulsion system for the E5 series Shinkansen ("Bullet Train") of East Japan Railway Company, and conducted field tests for one year. The test results have verified that the system satisfactorily fulfills the required performance standards.

Tests have been conducted on the main transformers, main converters, and traction motors, which incorporate our latest technologies in order to achieve high speed, reduce the effect on the environment, and guarantee high quality. The equipment will be standardized and will also be compatible with the E6 series, a prototype of which is currently undergoing tests. The E6 series is planned to be operated on local lines as well as on Shinkansen lines.

In the field tests, we focused on measuring the traction performance and rise in temperature of each piece of equipment. Following the application of the test results, the E5 series commenced operation in March 2011.



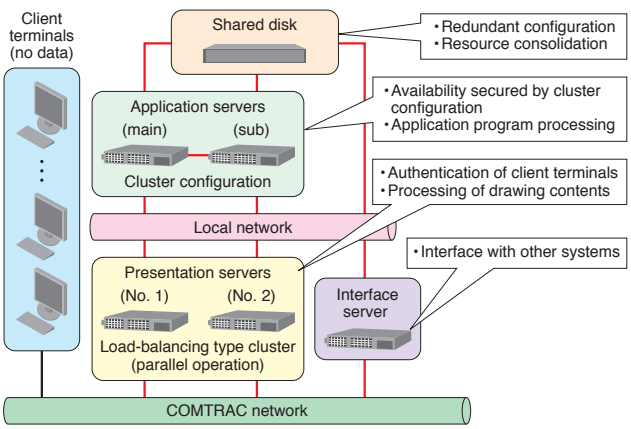
Prototype E5 series Shinkansen of East Japan Railway Company

Renewal of Transportation Planning System of COMTRAC for Central Japan Railway Company

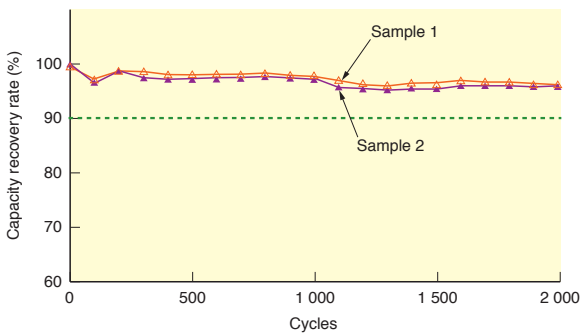
The transportation planning system of the Computer-Aided Traffic Control (COMTRAC) system allows basic operating plans, rolling stock operating plans, and seasonal operating plans to be efficiently prepared for the Central Japan Railway Company's Tokaido Shinkansen.

In renewing this transportation planning system, Toshiba adopted a thin client system and three-tier architecture so as to provide the optimal platform to planners who had utilized the previous system, in which resources were stored individually.

The thin client system achieves higher security, energy saving, and space saving, while the three-tier architecture composed of a shared disk, application servers, and presentation servers improves maintainability, availability, and operability.



Configuration of transportation planning system



Results of cycle-life tests of SCiB™ battery module

SCiB™ Battery System for Electric Motorcycles

Photo provided by Honda R&D Co., Ltd.

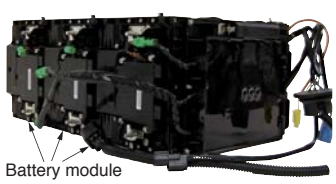
EV-neo electric motorcycle equipped with SCiB™ battery

There is a strong need for the practical realization of electric vehicles (EVs) to reduce carbon dioxide emissions. Lithium-ion batteries, offering reduced size and weight, are playing an important role as key components in the promotion of EVs.

In cooperation with Honda R&D Co., Ltd., Toshiba has overcome various technical issues and developed a battery system for electric motorcycles applying the highly safe SCiB™ battery. The SCiB™ battery system is installed in the EV-neo electric motorcycle that was released by Honda Motor Co., Ltd. in December 2010. The EV-neo, designed for commercial use, makes best use of the features of the SCiB™ battery; namely, safety, long life, high power output, good performance even in low-temperature environments, and fast charging.

The SCiB™ has proven to be a highly safe battery based on various tests such as the bar crush test on battery cells, nail penetration test on battery modules, drop impact test, short-circuit test, and immersion test. In these tests, no bursting, fire, smoke, or leakage of electrolyte has been observed.

In addition to its excellent safety, the SCiB™ battery achieves a long cycle life sufficient for application to electric motorcycles, with a capacity recovery rate of not less than 90% after 2 000 cycles of use. It also has a high power output that allows a motorcycle to climb a 12° slope, can operate at temperatures as low as –10°C, and can be charged within about 30 minutes, all in a small package that can be mounted on an electric motorcycle.



SCiB™ battery system

Mass Production of High-Efficiency Motors Commenced in Vietnam

Toshiba Industrial Products Asia Co., Ltd., Vietnam

NEMA Premium™ efficiency motor (2 P-3.7 kW)

Toshiba Industrial Products Asia Co., Ltd. constructed a new factory to manufacture high-efficiency motors for industrial use at the Amata Industrial Park on the outskirts of Ho Chi Minh City, Vietnam, and commenced mass production in September 2010. Motors of up to 75 kW output and realizing an approximately 30% reduction of energy loss in compliance with the IE3 efficiency standard(*1) are manufactured at this factory. Products with the most compact dimensions and lightest weight in the industry(*2) are achieved by optimizing the electromagnetic structure and cooling system. These motors are contributing to the reduction of carbon dioxide (CO_2) emissions and responding to the expanding global demand for high efficiency.

From this factory, Toshiba is supplying competitive high-efficiency motors complying with the legislation of each destination country as well as NEMA Premium™ efficiency motors conforming to the legislation that came into effect in December 2010 in the United States. Production capacity will be expanded to 1.2 million units annually in 2015 and the new factory will become Toshiba's largest motor manufacturing base.

Toshiba has established a production system that is able to supply motors to worldwide markets with the inauguration of this factory in addition to the existing facilities of Toshiba Industrial Products Manufacturing Corporation (Mie, Japan), Toshiba International Corporation (Houston, USA), and Toshiba Dalian Corporation (Dalian, China).

(*1) A motor efficiency standard defined by the International Electrotechnical Commission (IEC)

(*2) As of September 2010 (as researched by Toshiba)

NEMA Premium is a trademark of the National Electrical Manufacturers Association.

FA3100G Model 1000 Industrial Computer for Overseas Markets

FA3100G model 1000 industrial computer for overseas markets

Toshiba has developed the FA3100G model 1000 industrial computer for overseas markets as part of the FA3100 series. This product inherits the industrial computer technologies that we have cultivated in Japan, and is manufactured overseas.

The main features are as follows:

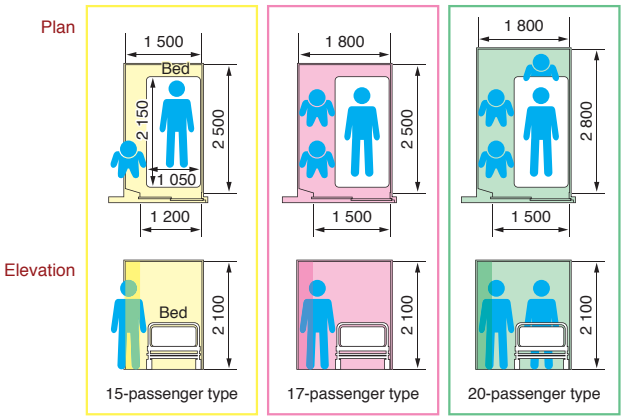
- Maintenance is improved by allowing the hard disk drive (HDD) to be exchanged from the front of the computer.
- High reliability is secured by increasing the mechanical strength of the power supply unit and improving the noise resistance of the main unit.
- Security of the HDD is enhanced by key locking of the front panel.

New Lineup of Hospital Elevators with Large Cages

Toshiba Elevator and Building Systems Corporation has developed a new lineup of hospital elevators providing a wide space, enabling nurses and assistants to transfer beds smoothly.

The cage width has been expanded to a range of 1 500 mm to 1 800 mm in order to accommodate 17 passengers, and the depth has been expanded to 2 800 mm to accommodate up to 20 passengers. The entrance width has also been increased to 1 500 mm to facilitate the loading and unloading of beds.

Available options include convenient functions operated at the elevator hall such as extended door-opening time and door-closing functions, a dedicated operation switching function, and a recall function for easy transportation of beds. Additional options include a long floor sheet to eliminate floor tile joints in the car and contamination-proof decorative sheets for the car side panels, for improved cleaning.



Cage interior

Buttons on hall side panel

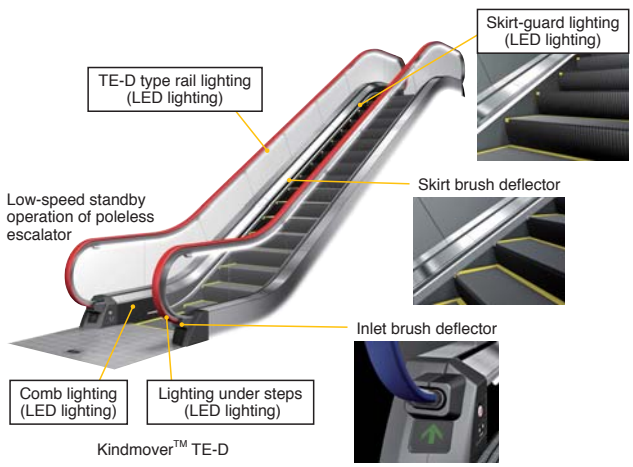
Hospital elevator with large cage

Kindmover™ Escalator with Advanced Safety and Energy-Saving Features

Toshiba Elevator and Building Systems Corporation has further enhanced the functions and performance of the Kindmover™ series escalator, which incorporates the principles of universal design, under the concepts of safety and energy saving.

The new escalator operates at a low speed in standby mode when there are no passengers as a standard specification, realizing energy saving of about 30% compared with our conventional type of escalator with constant-speed operation. Furthermore, power consumption has been reduced by about 70% by changing all lighting of the new escalator from fluorescent to the light-emitting diode (LED) type.

In order to offer a higher level of safety compared with our previous type, “inlet brush deflectors” are installed as standard equipment to prevent small children’s hands from easily touching the handrail return section (inlet section). In addition, “skirt brush deflectors” can be provided as an option to prevent shoes, sandals, etc. from being inserted between the steps and the skirt-guard panels.



Kindmover™ escalator