Toshiba’s transportation system technology is widely used all over the world.

Toshiba Locomotives

Leading Innovation

Toshiba Locomotives: Aiming to Meet Your Needs

High Availability with Water-Cooled Power Converter

Independent control is applied to high availability and performance.

Low-emission Transformer

Nitrogen gas sealed transformer technology realizes high efficiency at low temperature environments.

Efficient Traction Motor

PMSM (Permanent Magnet Synchronous Motor) technology realizes high efficiency of up to 97%.

Safe and Durable Lithium-ion Main Battery

SCiB™’s high performance main battery ensures safety, long life and good performance, even in low temperature environments.
Toshiba Locomotives: Aiming to Meet Your Needs

- **High Availability with Water-Cooled Power Converter**
  - Independent control circuit is equipped for high availability and performance.

- **Low-emission Transformer**
  - Nitrogen gas sealed transformer technology reduces need for insulation oil exchange.

- **Efficient Traction Motor**
  - PMSM (Permanent Magnet Synchronous Motor) technology realizes high efficiency of up to 97%.

- **Safe and Durable Lithium-ion Main Battery**
  - SCiB™ Toshiba’s lithium-ion battery realizes low-temperature environments, safety, long life, and good performance, even in cold environments.

- **Suitable for Hybrid Locomotive**
  - Main battery achieves high efficiency of up to 97%.

**Specifications**
- **DEL45**
  - Maximum speed: 120 km/h
  - Bogie Arrangement: Co-Co
  - Weight: 96 – 120 tons
  - Length: 15.0 m
  - Maximum Power: 3,356 kW

- **DEL35**
  - Maximum speed: 120 km/h
  - Bogie Arrangement: Co-Co
  - Weight: 96 – 120 tons
  - Length: 15.0 m
  - Maximum Power: 2,610 kW

- **HBR700**
  - Maximum speed: 60 km/h
  - Bogie Arrangement: Bo-Bo
  - Weight: 80 – 100 tons
  - Length: 15.0 m
  - Maximum Power: 4,500 BHP

**Table**

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**Additional Details**
- *The efficiency of PMSM was calculated with loss measurement based on IEC 60349-2 at the temperature below 40˚C from 8/25/2009 to 9/25/2009.*

**Features of SCiB™**
- Performance Long Life
- Safe and Durable
- Low Temp.
Diesel electric locomotive

Toshiba’s first electric locomotive

History

Toshiba’s first electric locomotive was built in 1926. This locomotive used electric components for locomotives built by Ishikawajima Shipbuilding & Engineering Co. Since 1969, Toshiba had been supplying locomotive components to customers outside Japan.

Overseas business in early times

Toshiba’s first electric locomotive was built in 1926. This locomotive was used for coal transportation. Since 1923, Toshiba had supplied electric components for locomotives built by Ishikawajima Shipbuilding & Engineering Co. Since 1969, Toshiba had supplied locomotive components to customers outside Japan.

Toshiba manufactured the 73-ton locomotive in 1923. The first electric components for the 40-ton electric locomotive built by Toshiba were supplied to customers outside Japan.

Toshiba’s first diesel electric locomotive was built in 1991 and some were delivered to various locations in Japan. Toshiba collaborated with Kawasaki Heavy Industry, Ltd. for the locomotives for steelworks with radio remote control. Toshiba manufactured 26 locomotives (500 HP/1050 HP) for Zambia and Brazil. Since 1981, 24 locomotives with two 500 HP Toshiba’s first locomotive was built in 1934, equipping a 750 HP diesel engine. Since 1969, Toshiba had been supplying locomotive components to customers outside Japan.

Key Technologies for Locomotives

Power Converters

Main image power converter suitable for locomotive - The optimal configuration can be realized

Power Converter for Electric Locomotives – Wide range of tractive power can be covered. The optimum configuration can be realized.

Modular design power converter cubicle for locomotive - 2-MPU (1,200 kW), 1-APU (230 kVA) 2-MPU (1,200 kW), 1-APU (230 kVA) 2-MPU (1,200 kW), 1-APU (230 kVA)

Cooling Unit

Auxiliary Power Unit (230 kVA) convertible to APU (up to 500 kVA) Main Power Unit up to 1,200 kW and

TCMS

PMSM technology with reduced energy loss realizes high efficiency up to 97%.*

Wireless Communication

SCiBTM anode material LTO (Lithium Titanium Oxide) makes the battery good performance, versatility and durability.

Recent Products

Organic solar cell

Longer performance was obtained with solar cell in outer sealing.

Altunity

Wireless charging system was developed.

PMSM (Permanent Magnet Synchronous Motor)

PMSM (Permanent Magnet Synchronous Motor) Class 29 Diesel Electric Locomotive Class 15E Electric Locomotive

HXD3 Electric Locomotive

HD300 Hybrid Locomotive

Class 19E Electric Locomotive

Prime mover: 720 HP Electro-Motive/720 HP Electro-Motive

Catenary Voltage: 20 kVac Catenary Voltage: 25 kVac Catenary Voltage: 50 kVac

Traction Motors

AC Induction Motor

Main Transformers

Main Alternator

Traction

Motors

TCMS

Power Converter for Hybrid

Power Converter for Diesel Electric Locomotive

Distribution of Powering/Regenerative braking command to other locomotives in the same train set with wired/wireless communication.

Driving screen examples

Recent Products

Electro Locomotive

HD300 Hybrid Locomotive

Class 19E Electric Locomotive

PMSM (Permanent Magnet Synchronous Motor)
Diesel electric locomotive

Toshiba’s first electric locomotive was built in 1934, equipping a 750 HP diesel engine. Since 1969, Toshiba had supplied electrical equipment for locomotives to Indian Railways. This locomotive business has entered the global market by supplying electric locomotives to Indian Railways. Since then, more than 2,000 locomotives or components have been supplied to customers outside Japan.

Overseas business in early times

Toshiba locomotive business has continued to the global market by supplying electric locomotives to Indian Railways. This new rail locomotive, which is a major product in Toshiba’s railway business, has contributed to the expansion of Toshiba’s locomotive business.

Toshiba’s first electric locomotive

Toshiba’s first electric locomotive was built in 1934, equipping a 750 HP diesel engine. Since 1969, Toshiba had supplied electrical equipment for locomotives to Indian Railways. This locomotive business has entered the global market by supplying electric locomotives to Indian Railways. Since then, more than 2,000 locomotives or components have been supplied to customers outside Japan.

Recent Products

- **Class 15E Electric Locomotive**
  - Application: Freight
  - Engine power: 2,580 kW
  - Axle arrangement: Co-Co
  - Maximum speed: 120 km/h

- **HD300 Hybrid Locomotive**
  - Application: Freight (heavy ion)
  - Engine power: 3,000 kW (continuous) at tread
  - Axle arrangement: Co-Co
  - Maximum speed: 120 km/h

- **FM6M (Permanent Magnet Synchro-Motor)**
  - Application: Freight (coal)
  - Engine power: 4,500 kW (continuous) at tread
  - Axle arrangement: Co-Co
  - Maximum speed: 90 km/h

- **Class 10E Electric Locomotive**
  - Application: Shunting
  - Engine power: 1,200 kW
  - Axle arrangement: Bo-Bo
  - Maximum speed: 60 km/h

- **AC Induction Motor**
  - Application: Freight (heavy ion)
  - Engine power: 1,200 kW
  - Axle arrangement: Bo-Bo
  - Maximum speed: 120 km/h

Key Technologies for Locomotives

- **Power Converters**
  - Main power link: up to 1,200 kVA and control system: 100 kVA

- **Cooling Unit**
  - Convertible to APU (up to 500 kVA)

- **Main Battery**
  - SCiB™ anode material LTO (Lithium Titanate Oxide) makes the battery good performance,
  - PMSM technology with reduced energy loss realizes high efficiency up to 97%.*

- **Motors**
  - PMSM (Permanent Magnet Synchronous Motor)

- **TCMS**
  - Distribution of powering/regenerative braking command to other locomotives in the same train set with wired/wireless communication.

- **Auxiliary Power Unit (APU)**
  - Toshiba supplied electrical equipment to Transnet, Republic of South Africa.

- **TCU (Train Control Unit)**
  - Toshiba supplied electrical equipment to Transnet, Republic of South Africa.

- **Main Transformer**
  - Toshiba supplied electrical equipment to Transnet, Republic of South Africa.

- **Main Battery**
  - Toshiba supplied electrical equipment to Transnet, Republic of South Africa.

- **Main Alternator**
  - Toshiba supplied electrical equipment to Transnet, Republic of South Africa.

- **TCMS**
  - Toshiba supplied electrical equipment to Transnet, Republic of South Africa.