



Cummins Rail News

September 2016

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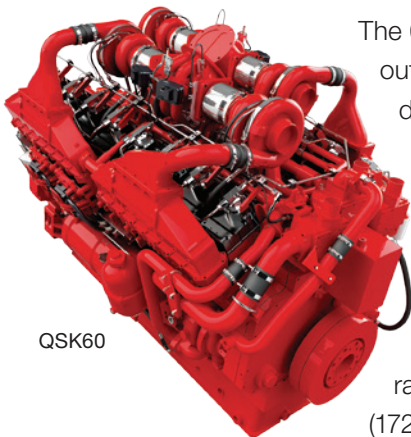
From the Archives

Wherever there's advanced rail technology, you'll find Cummins power. Under the floor on Europe's high speed passenger trains, or fitted on 20 ton grinders in the Far East, Cummins is on track with the most progressive rail companies in the world. With a power range from 49–4400 hp (37–3282 kW) Cummins has many ways to power your equipment.

With over 70 years of experience in the Rail Industry Cummins recognizes that rail equipment serves unique environments and modes of operation. Cummins is committed to continuous improvement and supports projects worldwide — our Engine Experts find themselves in a wide range of challenging and interesting environments to support Customers.

Introducing the QSK60 Stage IIIb to Europe

Cummins QSK60 has now achieved Stage IIIb Emissions Certification



QSK60

The 60ltr engine delivers outstanding reliability and durability with extended maintenance intervals and excellent fuel economy in locomotive applications all around the world. With a power range of 2310–2700 hp (1723–2013 kW) and

governed speeds of 1800 rpm this power horse is now ready to transform European locomotives and other rail equipment. Around the world the QSK60 already boasts low operating costs and a long engine life-to-overhaul, making it an industry leader in productivity and total life-cycle value.

Every major system and component for the QSK60 is designed by Cummins to work as an integrated unit, optimizing performance with ratings up to 2700 hp (2013 kW). Cummins aftertreatment solution uses a highly robust Selective Catalytic Reduction (SCR) system to reduce oxides of nitrogen (NOx). Cummins proven SCR systems are currently being used in over a half-million pieces of equipment around the world. The system is flow-through and is capable of high NOx conversion with low backpressure, which delivers great fuel efficiency. The QSK60 is suitable for new and repower locomotive projects.

The QSK60 is the latest addition to the Cummins Stage IIIb rail engine product range.



For more information on the QSK60 Stage IIIb Engine:

Scan this QR code or visit

cumminsengines.com/brochures.aspx

Life begins with the QST30

The QST30 sets unbeatable standards in Rail diesel productivity for shunting, with up to 1200 hp/895 kW of power and 2100 lb-ft/2847 N.m of torque. It has become a popular engine choice for locomotive repowers due to its size and ease of installation. When locomotives are in need of modernisation the 30 ltr engine enables the operator to benefit from the latest engine advances that were not available when the original engine was installed. The process of locomotive refurbishment allows key equipment to remain in service for decades longer than the original design life.

Repower in Romania

The Romanian railway group Grup Feroviar Român (GFR) is the largest private Rail operator in Romania. They overhaul their locomotives in company owned Railway workshops supported by Cummins engineers. The teams manage the installations on-site, even completely dismantling and refurbishing the equipment when required. GFR designed their larger shunter to be integrated with the QST30 which extends the design life by a minimum of 15 years. These durable locomotives have long life potential requiring Cummins to support them for the duration.



GFR Shunter LDH1250
powered by Cummins QST30 Stage IIIa



Learn more about the remanufacturing process visit cummingsgenuineparts.com

To see how it's done, scan this QR code to watch our **Remanufacturing Video**

Fact File

- Once your engine has been remanufactured to a new engine specification, you get the same warranty as a brand new engine which in some cases can be extended.
- Remanufacturing requires about 85% less energy than manufacturing the same product from new parts
- By remanufacturing, Cummins is able to reuse or recycle over 22,000 tonnes of material each year and the amount of greenhouse gas reduced is approximately 100,000 tonnes per year.

Remanufacturing

Cummins has been involved with remanufacturing engines almost as long as it has manufactured new ones.

For operators already using Cummins engines a range of remanufactured and parts are available for refurbishment projects.

The process of remanufacturing an engine and related parts can be very complex—even more so than building a new engine as the Cummins products are not just repaired or rebuilt, they are completely remanufactured to meet Cummins stringent 'as new' specifications for superior reliability and durability.



TEM2-UMMC

Repower in Russia

In the summer of 2014, the Shadrinsk plant of automobile units (ShAAZ), a member of Ural Mining and Metallurgical Company (UMMC) performed the first modernization of TEM2 shunting locomotives by replacing the old medium speed engine with a Cummins QST30-L2.

UMMC is the biggest Russian manufacturer of copper, with an annual turnover of over five billion dollars (USD). UMMC combines operations of mining, metallurgical and metal-working industries located in Russia into one technological network. They have a vast fleet of mining equipment: dump trucks, excavators and front loaders as well as diesel locomotives of various models operating in open pit mines, processing and metallurgical plants.

By the beginning of the 2010, most of UMMC's diesel locomotives were aged and worn as they were coming to the end of their original design life cycle. The renovation of the diesel locomotives fleet became a critical issue for the company so they studied the Russian and Eastern European locomotive market to understand their options and concluded that modernizing the existing fleet was the best option. The choice to modernize allowed them to add value and consider current and future locomotive power requirements, rather than replace the engine like-for-like. UMMC decided the project should be completed at one of their own plants "ShAAZ" located in town 'Shadrinsk' where they had available capacity.

At the end of 2012 UMMC invited Hungarian company 'Woodward Mega' to help develop this locomotive modernization project and convert

the premises into an appropriate locomotive overhauling space. The project began with the TEM2 shunting locomotive—the 6-axle locomotive has DC electrical transmission and is the most common shunting locomotive within UMMC and other industrial and public railways.

Cummins and UMMC have worked well together in the past on powering dump trucks and other mining equipment. This coupled with vast experience in repowering and modernizing locomotives in Europe led to Cummins being selected as the engine supplier.

The process of modernization means that all parts above the locomotive base frame are scrapped, only the base frame, bogies and fuel tank remain the same. The bogies and fuel tank are repaired and the base frame is repaired and reinforced. The new parts are components installed on the repaired base frame, the drivers cabin and low profile loco hood. The old 882 kW and 17-ton medium-speed engine with DC generator is replaced by the new 895 kW and 4-ton high-speed Cummins OST30 engine with AC traction alternator.

Modernizing the TEM2 shunting locomotives has allowed the following advantages:

- New efficient AC/DC transmission, enabling more efficient operation
- New electrically driven auxiliary equipment, reducing parasitic loss from the engine
- New sophisticated electronic controls with engine and locomotive protective functions

The installation of the compact high-speed Cummins engine allows more space in the driver's cab, increasing driver comfort and reducing vibration and noise. It enables the use of a low profile hood to achieve an all-round view from the cab improving visibility. This space saving also allows room for an auxiliary genset on the locomotive which provides energy for utility devices and batteries charging during standby operations.

The modernized locomotive is called TEM2-UMMC and since it has been in operation it consumes on average 20% less fuel than conventional TEM2 shunting locomotives. The new engine and modern controls make the locomotives more agile, TEM2-UMMC locomotive performs the same operation 10-15% faster than a conventional shunter.

The next stage of the program was the modernization of the 4-axle diesel locomotive with hydraulic transmission, TGM4B. This is performed in a similar way: the old 600 kW engine is replaced by the new 635 kW high-speed Cummins QST30-L1 engine. The QST30 engine model was selected for ease of integration with the new Voith transmission which replaces the old domestic DH model.

This 4-axle modernized locomotive has been called TGM4B-UMMC. Their efficient operation

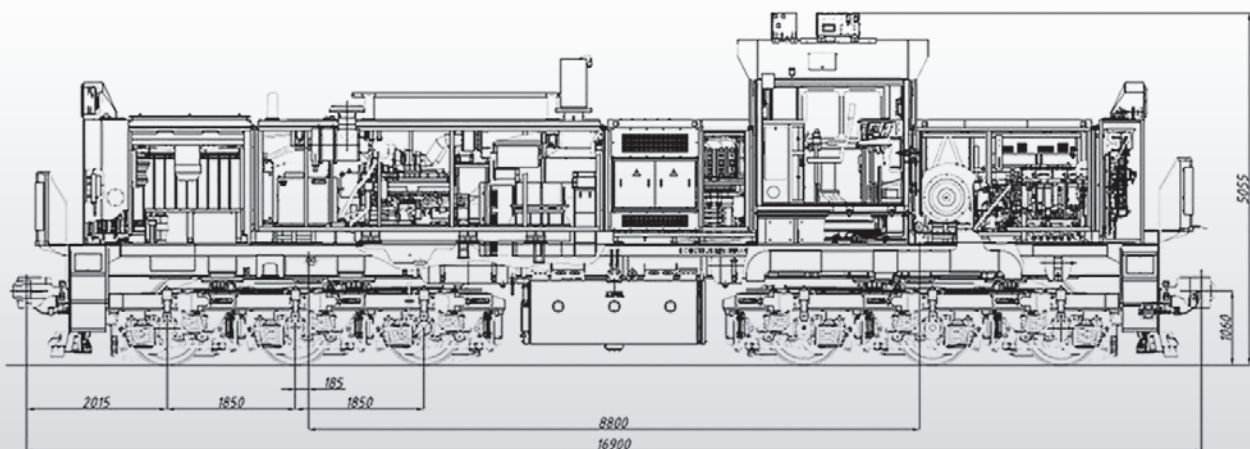


TEM2-UMMC DE Loco powered by Cummins QST30 L2 Engine

at the copper melting plant JSC Uralelectromed has allowed the company to reduce their fleet of locomotives from seven to four, whilst achieving the same workload. The total cost of operating the locomotive fleet has been reduced to less than half.

Today, 20 TEM2 and 8 TGM4B locomotives have been modernized. UMMC plan to continue this successful program and broaden its portfolio—the next locomotive ready for modernization is the heavy duty 4-axle diesel shunter with hydraulic transmission called TGM6. Next year UMMC plans to increase the number of modernized locomotives from 12-13 per year to 25-30 per year.

Running ahead with Russian Railways



The success of the TEM2-UMMC and TGM4B-UMMC repower project has allowed the relationship between Cummins and Russian Railways to blossom and there are more exciting projects to come. This summer Bryansk Engineering Plant (BMZ), a subsidiary of Transmashholding and the leading manufacturer of diesel locomotives in Russia and CIS, has unveiled a new prototype six-axle shunting locomotive powered by Cummins QST30-L2 for Russian Railways (RZD).

Estonia FLIRTs with new railcars

Rail passengers in this Baltic state can feel the benefit of Stadler's Cummins-powered FLIRT trains

The Estonian railway operator Elron has ordered 20 diesel electric trains for the interregional traffic between the cities of Estonia. The trains, a combination of two-car, three-car and four-car variants, are based on Stadler's highly successful FLIRT model, powered by the Cummins QSK23.

Elron was attracted to FLIRT (short for Fast Light Innovative Regional Train) by its clever design and ability to operate in the harsh conditions of a Baltic winter, as proven across the Gulf of Finland in the city of Helsinki. They also operate on the same 1520mm gauge.

Rail travel in Estonia is extremely popular with commuters and tourists moving between the capital Tallinn and the cities of Tartu, Viljandi and Narva. Passengers enjoy free WiFi and spacious seats with high back support and windows with adjustable sun shades.

The big multifunctional compartments of Stadler's FLIRT can be easily equipped to Elron's specification and the spacious step-free passage between cars offers excellent visibility within the vehicle.

Comfort is enhanced by the careful design of the running gear and drive systems. The 900 hp Cummins diesel engine is arranged in a powerpack that is separated from the thermally insulated passenger salon, a configuration that drastically reduces noise and vibration.

"One of the big advantages of the QSK23 and what makes it particularly suitable for trains is the fact it is an in-line six-cylinder unit rather than a 'V' configuration, which frees up the required space for the aisles," said Matthias Gollwitzer, Cummins Regional Sales Manager.

Cummins has been working with Stadler, which has a number of facilities across Europe, since 2006 when the two joined forces on a public transport project for Denton County in Texas.

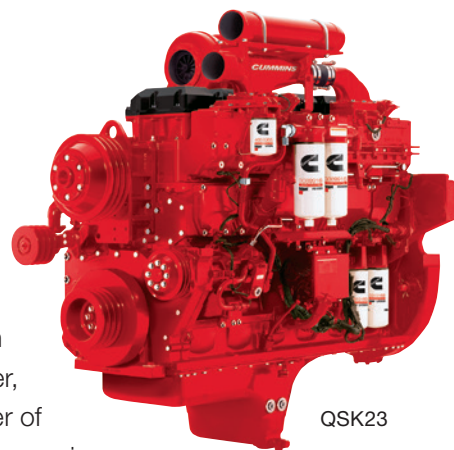
The first of the Elron FLIRTs went into operation, in August 2013, using QSK23 engines that were built before the end of 2011 so comply with Euro Stage IIIa emissions standards.

The engines—two per train are tailored locally to meet customer requirements. "There was some new componentry and parts and a new wiring harness required," said Gollwitzer. "The engines have performed exceptionally well in a very harsh operating environment where the required operating range is from -40° to +40° Centigrade."

Stadler, which enjoyed record revenues of 2.9 billion Swiss Francs in 2014, is now working with Cummins on the introduction of Tier 4 Interim engines for several new projects, including QSX15-powered trains for Sardinia, QSK38-powered trains for Russia and work is underway on a four-car dining wagon.

The company is focusing on the regional and suburban segments, the light regional express railway service, streetcars and rack railway vehicles, where it is already a world leader.

Stadler is also poised to expand into the US following a major order from Tex Rail for up to eight trains to serve the 43km rail line that links downtown Fort Worth with Dallas-Fort Worth airport.



QSK23



Your high horsepower emissions solution

The High-Horsepower Selective Catalytic Reduction (HHP SCR) System certified up to U.S. Environmental Protection Agency (EPA) Tier 4 Final emissions standards is the Emissions Solution for Rail – purpose designed for locomotive installations it offers the durability to operate in rugged conditions and is proven in many different working environments.

The HHP SCR System has a modular design which can be integrated into most mobile off highway, locomotive, power generation, rail or marine applications. This modular design has many benefits:

- Allows for multiple installation orientations, providing ease of integration and assembly for equipment manufacturers
- Offers reduced space claim, with optimized catalysts, controls and dosing capabilities, for easier equipment integration.
- Offers improved fuel efficiency, lowering overall cost of operation
- Offers flexible mounting options consisting of horizontal, vertical and upright positioning
- Comparable to previous Tier 2 silencer space claims, thus reducing customer integration costs
- Supports high-shock and vibration environment requirements
- Enables advanced, fully integrated SCR mixing
- Operating without EGR means there is less to cool, which helps lower the cost of OEM integration



Offering optimized mixing capabilities in order to maximize oxides of nitrogen (NOx) emissions conversion, our HHP SCR System design has been developed with a fully integrated and enclosed decomposition chamber inside the SCR package, with high-flow urea dosing capabilities. The integrated decomposition chamber reduces the number of equipment interfaces, as well as space claim.

Cummins engineering experts will work with your designers to deliver the best catalyst solutions for your applications.

Learn more about these high-horsepower solutions and other innovative products at cumminsemissionsolutions.com.

KIROW rail cranes

Originating in the Northeast of Germany you will find the Hidden Champions of Crane Manufacturing, KIROW. KIROW are World market leaders for high quality rail cranes in the Track Maintenance market.

The 'Multitasker 1200' used by Deutsche Bahn (DB) is powered by a Cummins Tier 4 Interim engine and can lift a staggering 160 tonne.

This impressive lifting capacity is achieved by the 400 hp QSL9 engine which allows 1200 lb-ft / 1627 Nm maximum load torque.

The ability to slew the boom while the counterweight stays in line is a key accolade for KIROW's multitasker as it means it can operate in areas where space is restricted. Multitaskers are ideally suited for the construction of switch points and bridges but are also a vital element of track maintenance in case of accidents or locomotive breakdowns, keeping the transport network on track.



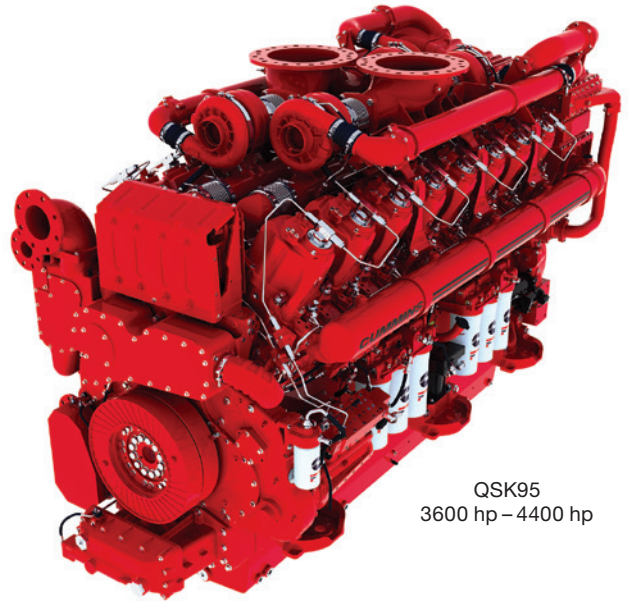
Working QSK95

Indiana Rail Road CECX1919

The QSK95 has now begun regular operations in CECX1919, a locomotive in the revenue fleet of Indiana Rail Road. Running between Indianapolis and southwestern Indiana, CECX1919 hauls loads of coal and intermodal freight making timely delivery to Indiana Rail Road customers along its route. The locomotive acts as a test unit for Cummins, providing insight into how the engine performs in a variety of conditions.

"Cummins is pleased to partner with another Indiana based company, Indiana Rail Road, operating one of the cleanest, most powerful locomotives in the United States," said Jim Trueblood, Vice President, Hedgehog Platform Team.

The QSK95 is powering Cummins ahead providing clean, dependable power for the rail market.



QSK95
3600 hp – 4400 hp



For more information on the
Cummins QSK95 scan here or visit
cumminsengines.com/brochures.aspx



Driving Success

The success of the QSK95 engine, dubbed “Hedgehog” which continues to lead the rail market rides on the quality and emissions readiness of this vast machine. Since its launch the QSK95 has held the distinction of delivering the highest output of any 16-cylinder high-speed diesel, delivering 4400 hp. More recently it earned another distinction when it received certification to Tier 4 Locomotive standards from the United States Environmental Protection Agency (EPA).

On March 31 2016 the EPA granted certification to Cummins for the QSK95 for Locomotives, making it the first single, prime mover engine to

gain certification. This certification is important for Cummins partnership with Siemens to allow their Charger locomotive to provide high speed passenger rail to the Departments of Transportation in California, Illinois, Maryland, Michigan, Missouri and Washington (USA).



“Receiving certification from the EPA marks a major milestone for the Hedgehog program,” said Melina Kennedy, General Manager Rail and Defense Business. “Customers can now be assured they’re receiving the most powerful and cleanest engine available to power their locomotives.”

Putting the Power in Passenger Locomotives

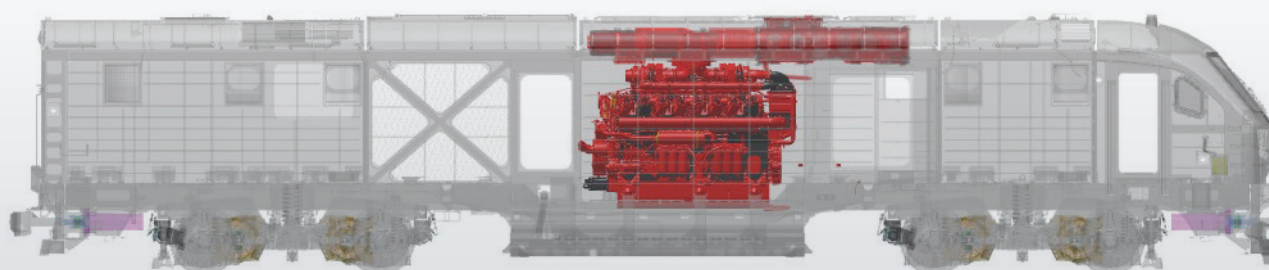
Siemens has been selected to build the locomotives and passenger coaches for Brightline, the express train service connecting South and Central Florida, USA.

The Siemens Charger diesel-electric passenger locomotives used for Brightline service is powered by the Cummins QSK95 diesel engine, manufactured in Seymour, IN. Florida’s passengers, communities and environment will all benefit from its use. The Charger is one of the most energy-efficient, lightweight, diesel-electric

locomotives in North America, thanks, in part, to the environmentally friendly QSK95. The clean combustion of the QSK95 works together with Cummins SCR aftertreatment to meet stringent Tier 4 emissions regulations of the U.S. Environmental Protection Agency (EPA).



To see how Cummins and Siemens install the Hedgehog scan here or visit news.usa.siemens.biz/blog/siemens-installs-first-cummins-engine-new-diesel-electric-charger-locomotive



Siemens Charger diesel-electric passenger locomotive



Japanese journey that never ends...

Japan Railways Central are one of the biggest railway companies in Japan, Cummins have worked with JR Central and the Train Manufacturer Nippon Sharyo for more than 20 years, with continued customer satisfaction the relationship continues to blossom.

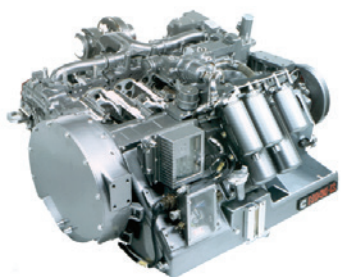
JR Central trains were originally powered by NTA855R1, a powerful engine fit for purpose but Cummins like to ensure customers continue to benefit from engine technology advances and

new products to help maintain their competitive edge. The trains have now been repowered with a Cummins QSN14R JWAC engine which is much more powerful and fuel efficient as well as being fitted with an Electronic Controls Module (ECM), providing vital engine diagnostics information when you need it the most. This access to diagnostics drastically shortens repair time as the ECM can pinpoint very quickly where any problem lies, getting the railcar back on track in no time.

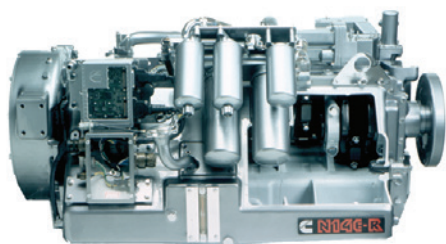


Cummins were able to deliver this Japanese repower quicker than originally planned and with minimal impact for the customer, which is

all down to the supportive approach by Cummins and the tailored customer solutions provided. JRC offer Japan the most important modes of transport for non-electrified areas of the country.



QSN14R JWAC



OEM: Nippon Sharyo
Project Period: 2013–2015
Investment: US\$ 110 mil.
Engine Model: QSN14R JWAC
Rating: 331kW@2100rpm
Application: DHC, named “KIHA25”
Number of Engines Delivered:
52 (DHC) + 3 (swing)

Victoria's VLocity railcars

The Victorian Government in Australia has announced it budgeted to purchase another 27 VLocity railcars from Bombardier Transportation. This will bring Victoria's QSK19-R-powered railcar tally to 225 units operating since service first began in 2005.

VLocity uses a modular concept for the propulsion and electrical power generation systems. Developed by an engineering team at Cummins South Pacific, the modular concept significantly reduces maintenance downtime. Each module is designed for quick replacement with a standby unit, meaning fast turnaround during scheduled servicing and maintenance. The tractive effort for the railcars will be provided by the QSK19-R with the HPI fuel system. Each VLocity car has a 5.9-litre B-series, 85 kW generator set for onboard electrical power generation.

The fleets in operation have vastly exceeded performance and reliability expectations and have become known in the industry for their reliability. Cummins South Pacific rail business manager Victor Lekhtman points out that a key measurement of the reliability of a rail fleet is the MDBF, or mean distance between failures. The MDBF is based on any delay in station arrival time of five minutes or greater. "The original expectation for VLocity was an MDBF of 70,000 kilometers, but the actual long-term MDBF average exceeds 145,000 kilometers which is phenomenal. It's unheard of in the diesel railcar industry. This puts us in an excellent position as Bombardier look towards their next generation of railcars" says Lekhtman.



From the Archives

'Roof Of The World' Railcar

The world's highest altitude railcars perform inspection work during building of the Qinghai to Tibet line in China, know as the 'Roof of the World'. Twin QSK19 Cummins underfloor engines provide 900 hp, specially adapted to operate under extreme conditions at 16,600 ft. (2003)

Himalayan Mountain Locos

Narrow gauge NDM-6 diesel locomotives were specially built for the high mountain railways of India. Tough 355 hp NTA855L Kirloskar Cummins engines enable the locos to climb 7,000 ft up sheer gradients on the world heritage Darjeeling Himalayan line with many zig-zag reverses, loops and bridges. (2000)

Fastest Ever Railcar

A test run of the 4-car VT605 intercity train in Germany set a record breaking speed of 138 mph for a diesel-electric multiple unit. Powered by 4 under-floor QSK19 engines, the total installed power was 3,000 hp. (1999)



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