

Cutting commuting time in Caracas

Västerås, Sweden, April 27, 2012 – More than a billion euros went into an ongoing revitalization project at Caracas Metro's Line 1. When the new trains roll down the track in Venezuela, they will have ABB-developed modular induction traction motors on board.

Line 1 at the Caracas Metro rapid transit system is getting a makeover. System operator Compañía Anónima Metro de Caracas commissioned a consortium of businesses to handle the massive project, with separate contractors providing rolling stock, signal systems, power supply and civil works. The goal of the upgrade was to offer the more than 2 million daily commuters of Line 1 in Venezuela's capital with a safer, faster and more reliable ride.

Spanish rail construction manufacturer Construcciones y Auxiliar de Ferrocarriles (CAF) provided the trains, delivering 48 new models to help update the 29-year old system. "We have developed an infrastructure and train technology that will reduce the time it takes between the end stations by ten percent, with a high level of reliability and safety," says CAF project manager Fernando Fuentes.

CAF delivered the first train on December 23, 2010, and at the time of writing 11 were in commercial service. The total investment for the Line 1 upgrade is 1.1 billion euros, 700 million of which were allocated for the new trains. Each new train has seven cars and can take almost 2,200 passengers from end station to end station in 66 minutes. The propulsion system features frequency converters, circuit breakers and brake resistors from CAF's daughter company Trainelec. They chose ABB to supply the motors that were needed: two per bogie or four per motor car. "First of all, the testing that ABB did was very convincing," says Niklas Höök, Director Sales and Marketing at Trainelec. "And since the design of the motor and converter had to be optimised to reduce space, their concept fit us very well."

Although ABB developed its first traction motor in 1909, the company had subcontracted other manufacturers' designs over the last few years. Returning to the railway scene as an independent manufacturer of traction motors with its first designs on the market, ABB couldn't have hoped for a better start for its modular concept in metro applications. "This was our first big metro project where we did the design ourselves, so it was quite a challenge for us," says Hans Samuelsson, head of ABB Traction Motors.

ABB is also an important developer and manufacturer of motors for industrial applications. "Many of the ideas and components originate from the industrial side, where efficiency is extremely important," says Samuelsson. "We have combined those ideas with a modular approach that offers a high degree of flexibility in terms of the motors' configuration and dimensions. The result is a robust design with high performance that is easy to maintain." Modular traction motors are scalable, with a range of flexible features such as bracket attachments, terminal box positions, cooling arrangements and pre-defined cross sections. They make it easy to customize a traction motor to the specific needs of a certain railway project without extensive lead times. This was important during the upgrade because the railway cars have an articulated bogie specially designed to match the track conditions on Line 1. The bogie is one example of a focus on robustness and reliability throughout the project, but there are more.

"Each train has 12 frequency converters that are independent of each other," says Iosu Ibarbia, CEO of Trainelec. "Two of them could go down and the performance of the train would still meet the requirements." Ambient conditions, such as air temperature and dust, have also been duly considered: the engines are self ventilated, while the converters have forced ventilation. "The cooling of both converter and motor has been designed with ample margins," says Ibarbia. "And the filters that protect the inlets can handle a lot of dust."

While the metro should never be forced to shut down for technical reasons, the economic aspects of the actual operation must also be considered. Energy-wise, the trains have an efficient propulsion system including braking energy recovery. There are also advantages in terms of maintenance. "This current technology can be maintained in a more efficient way than the previous one," says Fuentes. "In terms of accessibility to different parts of the equipment and how tasks are carried out, everything is easier." This increases the system's availability, which is a real benefit for the two million daily passengers on the Caracas Metro Line 1.

Press Release



Factbox:

On Line 1

Train manufacturer:	CAF
Number of trains:	48
Number of cars	336
Cars per train:	7 (A train has two cabbed motor cars, four intermediate motor cars and one intermediate trailer car).
Length per train:	150.2 m
Capacity per train	2,176 passengers
Maximum speed:	80 km/h
Power supply:	750 V DC (via third rail)
ABB traction motors:	1,152 units altogether, 200 kW rated power and 2,550 rpm nominal speed, 4-pole. Four per motor car with two in each bogie.
Frequency converters:	By Tranelec and based on insulated gate bipolar transistor technology, with an operating range between 450 and 950 V DC. Two per motor car.

ABB (www.abb.com) is a leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 130,000 people.

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