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Autor: [s.n.]
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Making Tracks for TRAXX!

‘The Minuteman’ recently went out on patrol to seek the Bombardier TRAXX family of Locomotives.

Photo: Bombardier PR

I find railway modelling has that capacity of never ceasing to open one's eyes and draw one's attention to some facets of railway technology that might otherwise slip your attention as a member of the fare paying railway travelling public. And so it was when in Germany, riding the rails from Switzerland through to the UK, something I can't quite place a finger on exactly, drew my attention to the TRAXX class and subsequently to the proliferation of variants at home in Europe, but also those to be found across 'The Pond' in operation with New Jersey Transit (ALP-45DP & ALP-46 variants). Modelling the BLS transalpine route and being drawn to the BLS 485s "Connecting Europe" and "Die Alpinisten" colour schemes on digitally equipped HO-scale models (see below),

I decided to keep my eyes open in the Confederation in case I should encounter a handful. I was not to be disappointed when in the Basel to Brig North/South Corridor, as can be seen from the photographs. And I was to notice a distinctive weathering feature that has become apparent – the two 'Λ' (inverted Vs) along each side caused by water runoffs from roof joint channels.

With a little research by reviewing the manufacturer's press releases, Bombardier Transportation has delivered TRAXX F140 AC electric locomotives to both the BLSC (customer designated Re485s and 486s) and SBBC (designated Re482s), for use on cross-border (Switzerland - Germany) and Alpine transit services. These locomotives feature regenerative braking,

enabling energy from braking the train to be fed back into the overhead lines; drivers' cabs equipped with rear view cameras to improve visual safety and, in addition to German and Swiss train protection systems, locomotives are equipped with European Train Control system (ETCS Level 2), enabling them to run in both the Lötschberg and Gotthard Base Tunnels. The elements common to all variants include the steel body; two bogies, each with two

BLS Cargo 185 No.526 and 485 No.001 photographed at Brig in June 2018. The former is an ex German 185 adapted to operate in Switzerland.

All photographs by the author
EXCEPT those marked "Bombardier PR"



powered axles, asynchronous induction motors, cooling exhaust and wheel disc brakes.

Technical concept

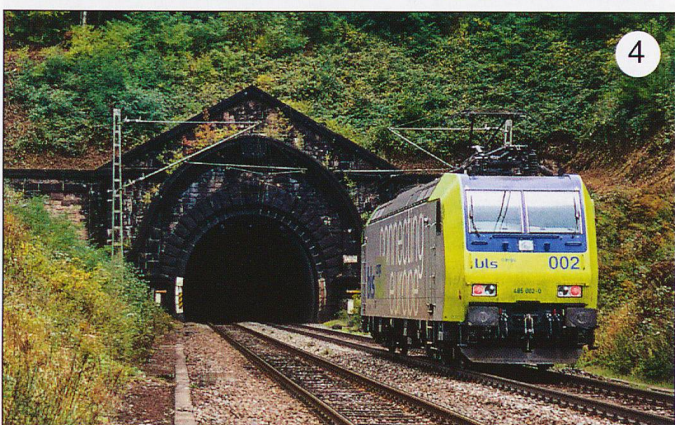
So what is the origin of TRAXX? The acronym stands for Transnational Railway Applications with eXtreme fleXibility. I wonder if it was a committee that came up with that mouthful – hardly an inspirational moment from a single railway engineer? But I digress. The brand was introduced back in 2003 with the railway companies of Western Europe being the prime intended recipients. But its concept goes back to the early 1990s when Deutsche Bahn (DB) wished to replace ageing electrics and a number of concept locomotives were offered and innovative technologies evaluated, like those included in AEG's 12X, now considered the predecessor to the TRAXX family. Innovations like water-cooled inverters based on GTO Thyristors (Gate Turn-Off Thyristors – a high powered semi-conductor device developed by General Electric which is a fully controllable switch!); a new final drive concept with pivot axle bearings on both sides and a new bogie concept with a short wheelbase of 2,600mm, that were later to find their way into the TRAXX. Indeed, reports indicate the 12X was later used as a testbed for further new technologies, becoming the first locomotive in the world with IGBT (Insulated-gate bipolar transistors – primarily used as an electronic switch), based converters in 1997 and testing the MITRAC (Modular Integrated TRACtion system) traction control electronics from 1998. Both of these technologies would later find their commercial application in TRAXX locomotives.

A number of railway company mergers took place during these years. In January 1996 ABB and Daimler-Benz merged their railway businesses, incorporating parts of AEG to form Adtranz. Then Bombardier bought Adtranz in 2001 and in 2003 Bombardier introduced the TRAXX brand name for the Class 185. The following year, the basic TRAXX design was subjected to a major overhaul to comply with crashworthiness standards; replacement of the GTO Thyristors with IGBT based inverters, an option for individual axle control in place of individual bogie control; coolant of converters altered; body standardised; strengthened frame, and this generation became known as TRAXX2. Then again two years later the body and internal configuration were modified when the diesel electric became available, so layout would be standard between AC and diesel powered units.

Locomotives are assembled and tested at Bombardier's plant in Kassel, with the exception, I understand, of the DC only version, which is assembled in northern Italy and an order received in 2014 for 240 dual-voltage, 1,067 mm gauge for Transnet in South Africa.

A modular platform

As its name implies, the TRAXX has a modular platform construct, and offered in both electric and diesel-electric variants. It is a Bo'Bo' design with ability to be delivered for 1,435mm standard gauge through to the Iberian 1,688mm gauge operations. The locomotive length is 18,900mm, width 2,980mm, new wheel diameter 1,250mm and depending on the options, the weight is between 80 to 85t, with an axle



1. BLS Cargo 485 No.007 takes a break at Basel on a Hupac rolling highway train in June 2018.

2. Another Hupac intermodal pauses at Spiez in June 2018 headed by a pair of BLS Cargo 485s. Twenty of this type were supplied to BLS.

3. A trio of BLS Cargo TRAXX rest at Spiez. The front loco is of Class 486 capable of DC operation into Italy (hence the red stripe over the buffer beam). The other two are dual AC Class 485s.

4. A Bombardier PR picture of a BLS Cargo Class 485 about to enter the old Schlüchtener tunnel south of Kassel, Germany.

load of approximately 22 t. As with competitor offerings like the more recently introduced Vectron (Siemens answer to Bombardier), the TRAXX can be equipped with AC 15 kV/16.7 Hz, 25 kV/50 Hz, Multi System (MS) 15 kV/16.7 Hz, 25 kV/50 Hz, DC, MS 1.5kV and 3kV DC along with the appropriate pantographs. The power output varies between electrics at 5.6 MW through 4.0 MW for the 1.5 kV version, down to 2.2 MW for diesels that have a fuel capacity of 4,000 litres. And the mixed kaleidoscope of European safety systems are also covered.

The tractive effort made available ranges from 270 through 300 kN, resulting in maximum speeds of 140 km/h for freight and 160 km/h for passenger versions. It's been reported there is also a 200 km/h option that can be made available.

In 2011 Bombardier announced a new TRAXX electro-diesel model dubbed the "Last Mile Diesel", that combines the standard AC propulsion system with a diesel engine to power the locomotive in light-duty applications such as operating on non-electrified sidings or yards. The launch

customer was an order for five units from Railpool. A more recent version is the TRAXX AC3 equipped with the Last Mile diesel engine function and is designed to cover all mainline freight applications in continental Europe under 15 and 25 kV AC catenaries.

Through all the variants, over two thousand two hundred and fifty have been manufactured and of these more than one thousand four hundred are operating in Europe and as of 2018 production was still taking place. At the time of writing CD Cargo (the freight subsidiary of Czech Railways) have placed an order for 50 TRAXX MS3 with the last mile function. According to Bombardier, the locomotives will be assembled at Bombardier's site in Kassel, Germany, with the car bodies coming from Wroclaw, Poland and the bogies produced in Siegen, Germany. The first ten of these units will be used for freight and passenger transport in the Czech Republic, Slovakia, Germany, Austria, Poland and Hungary, while extending the fleet's operability to Slovenia and Croatia.

European operator orders have ranged from single units through to two large ones of 200 (2001-2003) and 199 (2004) respectively by DB and Railion; later DB Schenker for F140 AC and F140 AC2 variants. The AC2 members feature the improved crashworthiness and water-cooled IGBT based inverters. SBBC units are from the AC2, designated Re482.2 and MS versions designated Re484. Operators with TRAXX to be seen in Switzerland include BLSC, DB Schenker, MRCE, Railpool, and SBBC and leased out Alpha Trains units.

For HO scale modelling enthusiasts, TRAXX models are available from well-known manufacturers including Märklin, Trix and Roco. Here are some examples:

BLSC / Railpool 187.0, TRAXX AC 3 LM (Märklin 36631 / Trix 22279)

SBBC Re 482 (Märklin 36851 & 37446)

BLSC 485 (Roco 69594 / 63594)


Swiss Rail Traffic 487 (Märklin 36635)

For N-scale modelling enthusiasts, TRAXX models are also available from well-known manufacturers including Fleischmann and Minitrix

Swiss Rail Traffic 487 (Fleischmann 738972)

DB-AG BR187 (Fleischmann 738971)

SBB Re 482 "Mädchen für Alles" (Minitrix T16903)

Sources include: Bombardier Transportation, Wikipedia (where there is a more detailed description of the development timeline and models), SBB Electric Locomotives Past and Present by Martin Fisher and Paul Russenberger – SE Publications and model manufacturers. 



1. SBBC 482 000 Basel SBB June 2018

2. Railpool has leased TRAXX vehicles to European operators for 10 years now. Here BLS Cargo 187 004 awaits a turn of duty at Basel Bad in June 2018.

Illustrations: Bombardier PR

