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Solaris Trollinos tchéco/polonais.

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Czech/Polish Solaris Trollinos

Solaris Trollino trolleybuses are built by a two-company partnership. One of these firms is **Ganz Transelektro Közlekedési**, of Hungary, whose products can be found circulating in Landskrona, Riga, Tallinn, Roma and Napoli. The other is **Dopravní podnik Ostrava (DPO)**, which as well as being a manufacturer also operates urban public transport in Ostrava.

DP Ostrava works together with Cegelec, and its Trollino vehicles grace the streets of Ostrava and Opava in the Czech Republic, Gdynia and Tychy in Poland, Vilnius in Lithuania, and most recently Winterthur and La Chaux de Fonds in Switzerland.

How Trollino Evolved

In 2001 Solaris Bus & Coach, ALSTOM, and DP Ostrava held initial talks on producing trolleybuses as a joint venture. The body of the first vehicle to result from this collaboration was delivered to DPO in April 2002, the design being based on the first generation Solaris Urbino 12 bus and featuring rustproof stainless steel side panels in order to extend its lifespan. Cegelec supplied TV Progress DC traction equipment with a traction motor of 110 kW nominal output. The trolleybus, branded as Trollino 12 DC, ran under its own power for the first time on 26 April 2002.

It was then decided to produce an AC version with an asynchronous traction motor. For this Cegelec supplied TV Europulse traction equipment, together with a new TAM 1009C traction motor of 175 kW nominal output. This was developed by ČKD PRAGOIMEX. As for the bodywork, a second generation Solaris Urbino 12 was used. New second generation features include CAN bus control of the 24 V electrical circuit, resulting in simplification of the latter. The number 12 in the designation refers to the length of the vehicle. Subsequently a 15-metre Solaris Trollino 15 AC model was developed, while in 2005 an articulated 18-metre model was unveiled, as described below.

A Major Lithuanian Order

The urban transport operator in Vilnius, the capital of Lithuania, is Vilniaus troleibusai. Its trolleybus fleet comprises ŠKODA 9Tr, 14Tr, and 14TrM models, ŠKODA 15Tr articulated vehicles, and 120 MT models supplied by PNTKM/Jelcz. The ageing 9Tr trolleybuses, the last of which was supplied in 1982, are to be replaced by new Solaris Trollino 15 AC vehicles.

Running tests in Ostrava on 3 October 2004 and photographed at the ZOO terminus was the first Solaris Trollino 15 for Vilnius.

Photo: Robert Kindl

Vilnius suffers from severe winter climatic conditions, with temperatures often down to -25 °C and heavy snowfall. To combat the latter, the grit and sand sprayed onto roads contains a number of aggressive chemicals. Operating conditions for urban public transport vehicles are not therefore particularly friendly. In the winter of 2004 it was decided to send a Trollino 15 AC (DPO's 3601) to Vilnius to evaluate its performance. The end results were highly satisfactory, and the benefits of using rustproof stainless steel body panels were soundly demonstrated.

For the Vilnius trolleybuses Cegelec supplied TV Europulse traction equipment. This drives an asynchronous, six-pole traction motor of 175 kW nominal output. A new feature is a TSS 2.2 semi-automatic pantograph supplied by the well-known Czech firm of LEKOV, with current-collection skids and contact shoes provided by ESKO of Praha. Text information panels are supplied by BUSE of Blansko and ticket validators by Mikroelektronika of Vysoké Mýto. Sensors are fitted to record the weight of the vehicle as it departs from each stop. This provides a reasonable measure of the number of passengers on board at any given time, and hence of overall patterns of route patronage. The interior, including the driver's position, is air conditioned.



The first Solaris Trollino 12 AC became DP Ostrava's 3701. It is seen here on 26 March 2003 on ul. Varenská in Ostrava.

Photo: Jaromír Štěpán

In October 2004 the first of these new trolleybuses arrived in Vilnius, with 14 more followed by the end of that year. Thirty more are expected to follow between 2005 and 2006, all being built to the same design.

Winterthur Opts For Articulated Trolleybuses

Although the 15-metre Solaris Trollinos are designated as high capacity vehicles, 18-metre articulated models are enjoying ever-increasing popularity, and orders are now coming in for the Solaris Trollino 18 AC.

The ten trolleybuses for Winterthur are single-motor vehicles, based on the body design and mechanical elements of the first generation Solaris Urbino 18 model, though also incorporating certain features from the second generation of the latter. The 250 kW

ČKD PRAGOIMEX asynchronous traction motor is fitted in front of the third axle, in other words beneath the articulated trailer, which is adequately soundproofed. By mounting the traction motor in front of the axle, space was made available for an auxiliary 100 kW KIRSCH diesel engine to be installed in the motor casing.

Such an engine can be used not only to enable the trolleybus to operate along diversions when streets are closed for roadworks, or to continue in operation should the overhead power supply be disabled for any reason. It also enables trolleybus routes to be extended as conventional bus routes beyond the network covered by overhead wires, and in an emergency makes it possible for trolleybuses to provide a substitute for ordinary buses.

The Trollino 18 AC is fitted with a roof-mounted TV Europulse traction



converter. This is linked by a CAN bus with the on-board computer via a second generation ABS/ASR system. This guards against slipping of the powered axle occurring, by reducing the pull of the traction motor. The ASR system, in addition, acts pneumatically to apply braking force to an axle which is experiencing slip. All this serves to reduce stress on the articulated joint between the two parts of the trolleybus, thus safeguarding against possible damage to this joint.

The installation of the auxiliary diesel engine meant that LEKOV was asked to supply a semi-automatic TSS 6.1 pantograph for this model. At the request of the customer, Verkehrsbetriebe Winterthur, the pantograph has to reposition itself automatically onto the overhead wire. Three such positions are possible. Verkehrsbetriebe Winterthur also specified the interior layout of the trolleybus. It requested that seating capacity should be as high as possible (50 passengers can be seated, and 20 of the seats are located within the low-floor area of the vehicle). Standaes are limited to 71 on account of maximum load constraints. The vehicle is fully air conditioned.

Great emphasis was placed on producing an environmentally friendly vehicle. Evidently, a trolleybus does not produce exhaust emissions in the same way that a diesel-powered bus does, though the Euro 3 norm also takes into consideration other sources of pollution. On account of this the Trollino 18 is fitted with service-free articulated shafts. These require no lubrication during servicing of the vehicle. Moreover, shaft rotation produces absolutely no leaks of lubricant.

Testing and staff training involving the prototype Trollino 18 started in Winterthur in March 2005, and it entered commercial service on 1 April 2005. Production of the remaining nine vehicles in the batch will be realized in 2005 as well.

More Articulated Trolleybuses For La Chaux De Fonds

In contrast to the Winterthur articulated trolleybuses, the five ordered by Les Transports Régionaux Neuchâtelois (TRN) for La Chaux de Fonds are twin-motor versions of the Solaris Trollino



The two types of Solaris Trollino for Les Chaux de Fonds were displayed outside the DP Ostrava trolleybus depot on 6 April 2005. On the left is the 18 AC articulated version, which carried the number L1 during trials in Ostrava; on the right is the 12 AC, temporarily carrying the number L2.

Photo: Robert Kindl

18 AC. Otherwise they are structurally essentially similar, being based on the first generation Solaris Urbino 18 with some input from the second generation.

La Chaux de Fonds is a mountain town. It is situated over a thousand metres above sea level, and is characterised by its steep streets and severe winter weather with heavy snowfall. Operation of the network using single-motor articulated trolleybuses was thus deemed inappropriate, so TRN requested that the second and third axles should be powered (with TAM 1050C6 traction motors). The company also asked for the casing of the motor to be eliminated from the interior space, thus providing space for four more seats in the trailer and also making it much lighter and more attractive for passengers.

The elimination of the motor casing, however, meant reconfiguration of the electrical equipment. This (supplied by Cegelec), now had to be mounted on the roof, together with the traction

batteries. Furthermore, TRN asked that the pantographs should be supplied without a lowering device. A simple guide rope system is used instead for re-wiring in the event of the pantograph losing contact with the overhead wire. LEKOV is the supplier of the TSS 5.1 pantograph. As in the case of the Winterthur trolleybuses, a large number of seats are provided - 48, of which 12 are in the low-floor section of the vehicle.

The prototype vehicle underwent initial tests on the Ostrava trolleybus network. It was dispatched from the factory on 14 April 2005, being sent first to Bolechowo for finishing touches before being delivered to TRN.

TRN Buys Solaris Trollino 12 ACs As Well

The order for articulated trolleybuses was followed by one for a batch of three Solaris Trollino 12 AC vehicles, though incorporating certain modifications as on the articulated ones. Most notable

of these is the elimination of the motor casing from the interior, enabling the fitting of an additional four seats. The single traction motor (TAM 1050C6) is positioned in front of the axle, with the traction converter mounted on the roof. LEKOV supplied TSS 5.1 pantographs. Seating capacity is 34, ten of the seats situated within the low-floor section of the vehicle.

Following test runs on the Ostrava network, the prototype vehicle left for Bolechowo on 13 April 2005, for finishing touches. Both the articulated and non-articulated prototype Trollinos entered commercial service at Les Chaux de Fonds on 23 May 2005, and the remaining six vehicles ordered (four 18 AC and two 12 AC) will be delivered by the end of the year.

Jaromír Štěpán, DPO

Photos, unless cited otherwise, by Pavel Novák, Cegelec

On a wintry 11 March 2005 Verkehrsbetriebe Winterthur's prototype Solaris Trollino 18 AC, No. 171, was realising trials in its new home town.



As shown in this photograph, the Solaris Trollinos ordered by TRN do not have motor casings cluttering the rear part of their interiors. The result is lighter, more spacious passenger accommodation. The prototype Solaris Trollino 18 AC is seen here, on 12 May 2005.

