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LION Reshuffling
Ukraine Stock News
EuroCarex Takes Shape
RegioJet Launched In Slovakia
Ukraine Prepares For New EMUs

Ukrzaliznitsya is taking delivery of three batches of new EMUs. Two six-car double deck trains are being supplied by ŠKODA, whilst Hyundai Rotem is delivering ten trains (see R 1/12, p. 8). The indigenous manufacturer KVSZ is scheduled to supply two EMUs and a rake of locomotive-hauled stock (see R 5/11, pp. 31 - 32).

All these trains are to be based and maintained at Kharkiv-Oktyabr depot (October, in Ukrainian “Zdrovet”) in Kharkiv-Sortirovchny (Ukrainian Sortovna, marshalling yard), situated in the northwestern suburbs of the city. Here a new maintenance hall, RED (Remontno-espirovchnoe depo), has been established, for train repair and equipment servicing. It has been built on the site of an old building, of which only the main supporting girders were retained. The new modern complex has its own boiler room, an electricity sub-station with transformers, a compressed air station, a fire-fighting station, and various other facilities and is provided with a fence to protect all the vehicle fleet and monitored by security cameras. The new building, shown in the image below, is 420 m long, 30 m wide, and has a maximum height of 9.6 m. There are four tracks, numbered 7 to 10. 7 and 8 are for the KVSZ trains, 9 is for the ŠKODA EMUs, and 10 is for the Hyundai Rotem EMUs.

All four tracks have standardised facilities, so each can be used for the maintenance of all three train types. The tracks run on steel beams, above inspection pits (see main photo, taken on 28 March 2012, with HRSC2-002 and 675 001 EMUs), enabling easy access to the undersides of the trains. This is the first depot on the Ukrainian network to have such an inspection facility. Maintenance will be realised at three physical levels. The lowest level involves work on the trains’ underframes and the underfloor equipment. The second level entails maintenance, servicing and cleaning of the interior and interior facilities. The third and highest is directed at keeping the roof-mounted equipment in good order. Alongside tracks 7 and 10 and between tracks 8 and 9 adjacent to the pits platforms are to be installed which enable depot staff to access the trains at all required heights. These platforms were supplied by the Italian firm of Bertolotti (which was also involved in providing some equipment for the new NTV depot at Nola).

It was also necessary to rebuild other facilities within the depot complex and marshalling yard at Kharkiv-Sortirovchny. The administrative block was radically modernised at the same time that the maintenance hall was rebuilt. For example, on the second floor there are now 11 new WCs, whereas there were previously just two, while in the whole block there are now 25 WCs, instead of the original seven. The right-hand photo shows a modern training classroom. The modernisation and reconstruction of the depot complex cost around 150 million UAH (around 12 million EUR).

In spite of the severe frosts early in 2012, work on the new facilities continued uninterrupted, to enable inauguration in April. The arrangement is that following arrival at Kharkiv-Passazhirsky terminus, the new trains will continue without passengers to Kharkiv-Sortirovchny, where first they will pass through a new washing installation and subsequently be subjected to maintenance. This will be carried out, in the case of low level examinations, according to what is required based on analysis of the trains’ on-board computers and a visual inspection of the vehicles.

UZ started special staff training in 2011 in connection with the anticipated arrival of the trains. We described in R 1/12 what arrangements were being made for the HRSC2 EMUs. For the Class 675 EMUs, 14 employees at Oktyabr depot were selected from a larger number of candidates who had been subjected to appropriate psychological tests. On 1 June 2011 they were first sent to Lubny, where there is a professional training centre. Then, in September they visited the Elektriniu traukinio depas (EMU depot) in Naujoji Vilnia, in the new eastern suburbs of Vilnius, where the maintenance base is situated for LG’s Class 575 EMUs (see R 1/09, p. 50), which are similar to the Ukrainian trains. The visitors were given opportunities to see the work of depot staff there, and to travel with Lithuanian drivers on the 575s between Vilnius and Kaunas (at present LG uses four of these trains, and is considering acquiring two more).

The penultimate stages of the training programme were realised back home, at Oktyabr depot, and involving a trip to Izhevsk in Russia in February 2012, to gain experience with the KLUB-U ATP equipment manufactured by Lhovsky radiozavod (IRZ) for the Class 675s. Then, finally, eight future Class 675 drivers travelled to the Czech Republic between 5 and 9 March 2012. They visited the ŠKODA VAGONKA works at Ostrava, and also the VUZ Velim test base, where they were able to drive the first of the two new trains. On 13 March a celebration was arranged during which the train was formally handed over to the UZ management.

The event was attended by Boris Kolesnikov, the Deputy Prime Minister of Ukraine and Minister of Infrastructure.

Between 26 and 30 March 2012 the remaining six trainees, those all Oktyabr depot maintenance staff, visited the Czech Republic to complete their course. In a sense history is being repeated, and older and retired UZ (ex-SZD) employees will recall the days in the 1960s when Oktyabr depot received from then Czechoslovakia the Class ChS-1, ChS-2 and ChS-3 electric locomotives. Hence Ukrainian railway staff nowadays are keen to see the old links being re-established with the Czech railway industry.

Ukrzaliznitsya, Jaromír Pernička

Pictures unless cited: Ukrzaliznitsya
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**pantograph AX-NG**

<table>
<thead>
<tr>
<th>Purpose</th>
<th>supplies voltage to the vehicle from the traction system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>-40°C to +45°C</td>
</tr>
<tr>
<td>Speed</td>
<td>up to 160 km/h</td>
</tr>
<tr>
<td>Current</td>
<td>2300 A</td>
</tr>
</tbody>
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The trains are intended primarily for passenger services linking Kyiv and Kharkiv, and it is intended to use them as well on long distance services between Kharkiv and Simferopol. Starting with the production of the Class 675s for UZ ŠKODA thus also made its debut in the field of building multiple units for long distance passenger services. Moreover, these are the second type of dual-voltage double deck trains built by the manufacturer (after the Class 671 EMUs built for ZSSK), and also, after LG’s Class 575s, the second built by ŠKODA of 1,520 mm gauge.

Operation in Ukraine implies certain specific modifications, and hence new requirements that had to be incorporated in the vehicle design. These adaptations fell broadly into three groups:

- first there were those required by the Ukrainian railway regulations and standards,
- then there were the specific demands placed on design by the rail infrastructure,
- and finally, there were the adaptations determined by the geographical conditions and the requests specified by UZ regarding the characteristics of the new trains.

Fulfillment of these requests was possible following the incorporation of some of the new design and technical modifications and also by using experience gained during the construction and operation of the Lithuanian Class 575s.

In Ukraine the standards applying to train design are those laid down by the GOST, OST and DSTU norms, and these obliged a number of significant changes for the design of the Class 675s, compared with earlier ŠKODA double deck EMUs. For instance, a Ukrainian fire protection system, produced by TELSIS of Severodonetsk, was installed, and the technical equipment in the cabs is different. Certain ATP and train safety systems were fitted (KLUB-U, TSKBM and ATC). These work simultaneously, and are hence designed for operation by either a driver or secondman. However, the usual rule on the Ukrainian network is for a driver and secondman always to be present in the cab. TSKBM is a safety system which monitors the driver’s physiological characteristics. The driver has a sensor which looks rather like a watch fitted to his hand. This can identify a sudden change of health status, such as loss of consciousness, a stroke, or heart attack, and then works in the same way as the driver failing to press the vigilance button, thus stopping the train.

The automatic train control (ATC) system, unlike the Czech version which determines train position through the location of magnets positioned on the rails, works by GPS, with an aerial to receive signals mounted on the roof above the cab.

### Ukrzaliznitsya’s Very First Double Deck EMUs

UZ’s new Class 675 EMUs are designed for inter-regional long distance services on the 1,520 mm gauge Ukrainian network, parts of which are electrified at 3 kV DC and parts at 25 kV AC 50 Hz. Each train consists of six cars (two powered end cars and four intermediate non-powered cars), has a maximum service speed of 160 km/h, and is designed for operation in an ambient temperature range of -40 to +40 °C.

- **Track Gauge**: 1,520 mm
- **Loading Gauge**: acc. GOST 9238-83 1-T
- **Supply Voltages**: 3 kV DC + 25 kV 50 Hz
- **Maximum Speed**: 160 km/h
- **Nominal Power**: 8 x 500 kW
- **EDB Power At Wheel Rim**: 3,400 kW
- **Train Length Over Couplings**: 158,400 mm
- **Car Length Over Couplings**: 26,400 mm
- **Distance Between Bogie Centres**: 19,000 mm
- **Bogie Wheelbase - Powered/Non-Powered**: 2,600/2,400 mm
- **Max. Bodyshell Width**: 2,820 mm
- **Car Height Over Rail Top (Pantograph Down)**: 5,100 mm
- **Tare Weight**: 334 t
- **Maximum Axle Load**: 21.5 t
- **Minimum Curve Radius Negotiable**: 120 m (up to 5 km/h)

**On 13 March 2012 at the VUZ test centre Velim the first Class 675 was formally handed over to its Ukrainian owners. From left to right are Volodimir Kozak, the UZ’s general director, Boris Kolesnikov, the Ukrainian Deputy Prime Minister and Minister of Infrastructure, Tomáš Krsek, the Chairman of the Board of ŠKODA TRANSPORTATION, and Jiří Paruza, the General Director of ŠKODA VAGONKA.**

On 13 March 2012 at the VUZ test centre Velim the first Class 675 was formally handed over to its Ukrainian owners. From left to right are Volodimir Kozak, the UZ’s general director, Boris Kolesnikov, the Ukrainian Deputy Prime Minister and Minister of Infrastructure, Tomáš Krsek, the Chairman of the Board of ŠKODA TRANSPORTATION, and Jiří Paruza, the General Director of ŠKODA VAGONKA.
Vehicle control itself is provided by the RRCPU-8/941 vehicle control unit. This central processing unit is equipped with eight CAN interfaces with galvanic separation (GS), one ETH with GS, one service USB 2.0 with GS and one RS485. This unit uses CAN with CANopen bus communication protocol (meeting CiA standards) for communication to the input/output units. As the key components of the remote I/O system RRC-xxx units are used. Those units meet the CANopen DS401 standard for communication and are in general designed and optimised for rolling stock control applications. All CAN connectors are chained (this simplifies the wiring). Also an RRC-KM geographic configuration plug-in module is used, serving for the setting of the communication rate and address which could be incorporated in the wiring of the minimised faulty configuration of the appropriate RRC I/O unit in the event of servicing or replacement. The signal connectors are WAGO (X-COM type). The huge variability of the I/O units as well as the possibility of customisation of the I/O modules, depending on the required type or number of signals, makes this system a universal and thorough answer for the control of a wide range of railway applications. The unique system of geographical addressing of the I/O nodes assists speedy module exchange, without the risk of faulty wiring. The vehicle control units are programmed by the TrolStudio developing tool.

AMIT, working in co-operation with then Moravskoslezská vagonka Studénka, started up its first development and production in the field of railway technology in the mid-1990s, the first products being control computers for the anti-lock braking system (ABS), and vehicle control units. In this field it has enjoyed considerable success. At the turn of the millennium the manufacturer started up a long-term co-operation with ELCOM. This led to the development and subsequent production of electronics control units for permanently installed AC power supply units, power converters and others more or less special products for railway uses. Electronics components produced by AMIT can be found on board many trains in the Praha metro, and even on the Czech Pendolino thanks to this co-operation.

A huge milestone in the history of the customised development of control equipment for rolling stock has been the start of co-operation with Cegelec of Praha. This has led to the design of a new control system for the modernisation of trams and trolleybuses. All the experience gained was used over the following years when AMIT designed new products according to customer needs. All designs and the resulting end products are realised by AMIT’s own development team.

In recent years a very competitive suite of products has been developed meeting the EN 50155 standard, such as panel computers, special PC based on-board computers, vehicle control units with CANopen communication, driving consoles, and IP distributed surveillance camera systems. Close working together between the AMIT development team and teams which in practice are using AMIT products, such as ŠKODA TRANSPORTATION and Cegelec, has had an important positive effect on the development of these products.

Roman Ulrych
AMIT, spol. s r.o.
Characteristics peratures as low as -40°C. This meant the ability for the trains to function in tempera-
ture conditions also required an assessment of the new railway infrastructure. Ukrainian standards, so that they could communicate with each other, required an evaluation of all components, and to prepare the trains for operation at such low temperatures.

Then there were the specific design requirements specified by UZ for the new trains. These focused mainly on modifications to the interior. One request concerned the provision of a bistro section in one of the intermediate cars. Another, the provision of a train manager’s office in both of the powered cars. With video screens provided in all the cars as part of the infotainment system, a complementary system had to be installed for the broadcasting of programmes and films. This meant an important improvement in travel comfort on board the trains. It was the first time that ŠKODA VAGONKA had provided such a system on board a train, since it is not yet found on any services operated within the Czech Republic. The required equipment was sourced from the German firm of Bustec. It consists of four video screens per car and a master control unit within the train manager’s offices, for controlling infotainment at the level of the whole train.

Seating is in open saloons. In second class the seats are in 2 + 2 mainly in bays, while in first class they are in 2 + 1 configuration, in a mixture of bays and rows. In all there are 623 seats, 46 in first class, and 16 tip-ups. The latter are situated in the wheel-
chair harness points. There are four of the latter, two in each end car. The Class 675, duly modified with regard to structure and design from its prede-
cessors, was designed for the provision of bays. The design is quite simple, with a welded frame, and is produced by ŠKODA. The saloon is fitted with second class seating, with wheelchair ramps, and is equipped with the ŠKODA’s wheelchair-accessible WC cubicle. The bogies are of a tried and tested design. They have welded frames, and helicoidal steel spring primary suspension. The secondary suspension system is pneumatic, with rubber air cushions. Above the cars are the roof-mounted train radio aerials.

The Class 675 EMUs are equipped with ABB’s type LOT 1340 traction transform-
ers (two per power car). These were also installed on the Class 575 EMUs for Lithuania, and then on the Class 675 EMUs for Slovakia. 38 such transformers have by now been delivered: nine (one a reserve) for LG, 21 (one a reserve) for ZSSK, and eight for UZ.

The transformers are installed in the machin-
ery rooms, and measure 1,200 mm in length, 770 mm in width and 2,061 mm in height, and weigh 2,500 kg. They include two traction windings, a heating winding, and an auxiliary winding, together with a 100 Hz second harmonics filter inductor device. Their insulation is of class A, they contain inhibited mineral oil, and are fitted with Buchholz relays. The cooling system is supplied by ŠKODA.

The basic construction of the bistro section in all types of EMUs. These were the same principles as those used for earlier ŠKODA EMUs. The structure is welded and integral, formed of large lightweight extruded profiles of alumi-
nium alloy. The cab ends are formed from self-supporting moulded laminates, of fibreglass and foam thermal insulation, this supplied by Mosel of Ceske Budějovice. At both ends of the train there are Scharfenberg-type automatic couplings (in this case supplied by Dellig), while the cars in each unit are joined by semi-permanent couplings.

The powered end cars are designated sub-Class 225. Each has a cab and two machine compartments, one in the front end, one towards the inner end. The upper deck is equipped as a first class saloon, while the lower deck, in the centre section between the bogies, is fitted with second class seating. Here also is the train manager’s office, and the wheelchair harness points. The forward entrance vestibule is equipped with manually operated wheelchair ramps, and situated here is the wheelchair-accessible WC cubicle. The bogies are of a tried and tested design. They have welded frames, and helicoidal steel spring primary suspension. The secondary suspension system is pneumatic, with rubber air cushions. Above the cars are the roof-mounted train radio aerials.

The complete traction equipment is installed in the powered end cars and is produced by ŠKODA. Type AX NG 2600 pantographs, supplied by FAVELEY TRANSPORT LEKOV, are sitted on the roof over the rear bogie, one on each end car. From the panto-
graphs the current first passes through a voltage system choice selecting switch, and then through the proper main switch. When the train is running under 3 kV DC the inter-circuits of the traction converters are linked directly to the overhead wire voltage. When the train is running under 25 kV AC the vol-
tage is first transformed by the traction transformers, supplied by ABB Switzerland, there being two of these in each powered car. Each transformer has two secondary windings for the traction, one winding to supply the 3 kV 50 Hz train heating system and one winding to feed the rectifier of the auxiliary drives, the output of which feeds the 570 kV circuits when the train is operating off 25 kV AC.

Incorporated in the traction conver-
ter blocks are devices that are neces-

A view of 675.001’s cab. The layout is similar to that of the cab of the ČD’s Class 471 CityElefant, with the console positioned on the centreline of the train. However, it is designed for use by a driver and secondman, as is standard practice in Ukraine. There are two fully equipped driving seats. The lever-activated traction and brake controls and direction of travel selectors are produced by FAIVELEY TRANSPORT LEKOV.
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The left-hand photo shows the interior of an upper deck second class saloon of an intermediate car, the right-hand view is of the upper deck first class saloon of one of the end cars. BORCAD supplied both the second class REGIO+ seat units and the first class type SEL seat units. The Altro-type flooring materials were supplied by AnViTrade of Praha.

On hand-over day, 13 March, 675 001 met another new ŠKODA product - 380.003, destined for ČD. The same day the EMU was ready to be moved to Haniska pri Košiciach en route to its new home in Ukraine. Here it is roughly at the halfway stage of its journey east, at Ostrava-Hrušov on 11 April 2012. Haulage is provided by ZSSK's electric 131.003/004. The wagons between the locomotive and EMU are carrying the new train's 1,520 mm gauge wheelsets and bogies.