MODERNIZATION AND REPAIRS OF ROLLING STOCK
An effective way of renewing your fleet is to modernize older coaches still in good condition that operators make available for a price considerably lower than what it costs to purchase a comparable new coach. The result is more efficient operation and quality for passengers that meet the current needs of modern transportation.

Pars nova, a subsidiary of Škoda Transportation, has been modernizing, reconstructing, repairing and manufacturing rolling stock since 1997, and has completed hundreds of projects in the past twenty years. Modernization gives customers an improvement in fuel economy and coach maintenance, extending their lifetime, providing ease of access to various components, greater comfort and safe travel for passengers, and last but not least a reduced negative impact on the environment. Modernized coaches are also adapted for sight-impaired passengers and those with reduced mobility.
EXPRESS COACHES Bdpee

With a track gauge of 1435 mm and tunnel length up to 5 km, Bdpee™ can carry passengers practically throughout Central Europe after installing new electrical equipment. The coaches will operate on the interstate and national lines of Eurocity and Intercity. They are the result of modernizing the original Bp 282 coaches from 1990 – 1991 built by Vagónka in Studénka, Moravia-Silesia.

The Bdpee express coaches are used for hauling passengers long distances with a maximum operating speed now increased from 120 km/h to 160 km/h. The economy-class compartment has ample space for passengers. The interiors of the coaches are completely air-conditioned, with seating and folding or fold-down tables. There are 230 V sockets for powering small electronics and a modern audiovisual information system for increased comfort.

New entrance doors, with the option of selectively preventing them from opening even when the train is stationary, add to the greater safety and comfort. The coaches also have new front doors, windows and a central energy source. The foyers are equipped with bike racks and two toilets within an enclosed system. Both foyers are separated from the passenger compartment by sliding glass doors.

REALIZATION

MODERNIZATION OF COACHES

Pars nova has been successfully modernizing coaches in recent years. This especially involves customized adjustments to the internal layout. In particular, it involves modernizing the interior (e.g. lighting, seating, wall linings and ceilings), installing components and systems (e.g. vacuum WC, information system, air conditioning). Modifying the body and bogie can achieve greater speeds.

REALIZATION

COACHES FOR INTERSTATE SERVICE Bhmzp, Bdmzp

These spacious, multifunctional economy-class passenger coaches are designed for international travel in Europe and other lines of national and regional railways with the standard track gauge of 1435 mm. These coaches will be operated on the Prague – Děčín – Berlin – Hamburg line. They come about from the modernization of the original passenger coaches Bmzp™. They are designed to transport passengers over long distances with a maximum speed of 200 km/h and are equipped with air conditioning.

In the modernization of the coaches, the original interior was completely removed and an entirely new spacious layout installed. The seats are now partially positioned one after another like in airplanes and passengers have folding tables available to them. Each pair of seats has a 230 V electrical socket and a USB connector for powering electronics.

The coaches are equipped with a modern audiovisual system with LCD monitors and Wi-Fi connection. Passengers with small children can take advantage of a small enclosed compartment for their trip. Naturally there is a wheelchair accessible toilet with an enclosed system, and it also comes with a folding counter for diaper changes.

FIRST, ECONOMY CLASS AND RESTAURANT COACHES

All modernized first and economy class coaches are equipped with Wi-Fi and a new audiovisual information system. The overhaul also included an air-conditioning for operating at temperatures greater than 36°C. First class also has adjustable leather seats, a new trim back (folding table, storage net, folding foot rest), integrated reservation system and individual reading lamps. All coaches were re-equipped with interior trim and upgraded toilets. Some of the economy-class coaches include a compartment for families with children and an area for people with reduced mobility.

Of the operating parameters, the central energy source was also changed to provide greater dependability of the coaches. The maximum permissible speed is 200 km/h. The new entrance doors comply with the standards TSI, UIC 540, EN1472 and TBO.
MODERNIZATION OF LOCOMOTIVES

Pars nova modernizes electric locomotives. This makes it possible to turn, for example, single-system locomotives into multi-system locomotives. It also makes it possible to adapt the systems to customer requirements (WBT communication, diagnostics, etc.). This improves the safety and dependability of the locomotives. It also increases the comfort of driving them, namely thanks to modernizing the control system.

REALIZATION

DUAL-SYSTEM LOCOMOTIVE 363.5

The 363.5 locomotive came about from modernizing original 163 DC locomotives. This modernization included, for example, installing a new traction transformer and completely new electric AC and DC equipment.

To increase operator comfort, the original doors to the cab and engine room were replaced with new ones with better seals. The panels were equipped with new controls and LCD displays. A completely new master control system with TFT displays on the engineer’s panel was installed and the locomotives can be driven with two operators. The power for the traction motors was increased to 925 kW, the original compressors were replaced with one oil-free compressor driven by an asynchronous motor. The coaches have been approved for operating on SŽDC, ŽSR and MAV tracks.

MAIN TECHNICAL PARAMETERS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>DUAL-SYSTEM LOCOMOTIVE 363.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traction system</td>
<td>3 kV DC, 25 kV/50Hz AC</td>
</tr>
<tr>
<td>Length across the buffer</td>
<td>16,800 mm</td>
</tr>
<tr>
<td>Length of the cabin</td>
<td>15,940 mm</td>
</tr>
<tr>
<td>Width</td>
<td>2,940 mm</td>
</tr>
<tr>
<td>Travel arrangement</td>
<td>Bo’Bo’</td>
</tr>
<tr>
<td>Service weight</td>
<td>88 t</td>
</tr>
<tr>
<td>Cargo</td>
<td>1,435 tons</td>
</tr>
<tr>
<td>Power</td>
<td>3,700 kW</td>
</tr>
<tr>
<td>Speed</td>
<td>120 km/h</td>
</tr>
</tbody>
</table>

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Repairing rolling stock is a traditional service performed by Pars nova for customers. Main and berthing repairs and overhauls include the bogies, transmissions, air fittings, corroded parts of the cabins or traction or internal combustion engines. An example is repairing the wall linings and upholstered seats.

Pars nova also repairs severe damage caused by collisions at railway crossings or with other railway coaches. Repairs also include replacing discontinued components or other components to achieve greater dependability and components that improve the cabin environment for engineers.

Examples of successfully completed projects include motor coaches 854, electric units 471 of CityElefant, electric locomotives 380, 381, 363 or repairing traction motors.

The electric locomotive 380 is designed for passenger trains for traction systems 3kV DC, 25kV/50Hz and 15kV 16 2/3Hz AC for a speed up to 200 km/h. The drive of the locomotive consists of four three-phase asynchronous squirrel cage traction motors. The traction motors are powered from traction converters. The auxiliary drives (compressors, fans) are driven by three-phase asynchronous motors. Traction is controlled by a microprocessor, and the locomotive can be controlled in manual, automatic speed control (ARR) or in automatic train control (ATC).

Locomotives 381 have a lower maximum speed (160 km/h) and are fitted with ETCS L1 safety equipment. Pars nova carries out regular periodic berthing repairs on these locomotives.

This universal electric locomotive is designed for traction systems of 3kV DC and 25kV/50Hz. The locomotives have pulse output control, DC wheelset drive with traction motors and joint coupling and transmission. Pars nova performs main repairs on these drives. This particularly means completely removing all units from the engine room and repairing and replacing them with more modern ones.

The modernization can improve the speed of the locomotive to 140 km/h by installing master control, including displays on the engineer's panel for cooperation with the coacher. It controls via WTB communication, adding the alarms, electronic tachographs, telral for remote data transmission, automatic speed control, and bridging emergency brakes or automatic train control. A new train controller, train radio, information system, including a display panel and camera system, can also be installed.
In addition to repairing and modernizing rolling stock, Pars nova also manufactures completely new components. These include the shell structures of the aluminum bodies for the electric single-floor units of RegioPanter and InterPanter. The company also manufactures and assembles common bogies for double-deck electric units manufactured by Škoda Vagonka for the Czech Republic (electric units 471 CityElefant), Slovakia (EJ 671), Lithuania (EJ 575) and Ukraine (EJ 675).

### DESCRIPTION OF ALUMINUM BODIES

<table>
<thead>
<tr>
<th>COACH</th>
<th>DIMENSIONS (MM)</th>
<th>WEIGHT (KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length</td>
<td>Width</td>
</tr>
<tr>
<td>HVD1 – head coach for long haul (head coach with collector)</td>
<td>23 100</td>
<td>2 820</td>
</tr>
<tr>
<td>HVD2 – head coach for long haul (head coach without collector)</td>
<td>23 100</td>
<td>2 820</td>
</tr>
<tr>
<td>VVD1 – embedded coach for long haul</td>
<td>25 700</td>
<td>2 820</td>
</tr>
</tbody>
</table>

### MANUFACTURING COMPONENTS

The bogie for embedded and drive coaches of the double-deck electric units 575 for Lithuanian Railways are two-axle with a 1520 mm gauge and air suspension and disc brakes. The wheelsets are equipped with three brake discs and compact wheels with noise dampers. The wheelsets and primary suspension are managed with saving units, containing 755 housing units. The springs of the primary suspension are triple-complemented with hydraulic dampers. The frame of the bogie is welded from two longitudinal beams, two central crossbeams and two tubular beams for the brakes. The longitudinal beams are compartmentalized in the central portion in order to make space for mounting the air suspension. The secondary suspension is an air membrane complemented by hydraulic dampers and two anti-roll bars. The transmission of the longitudinal forces between the bogie and the coach body is resolved as a lemniscate mechanism and pivot pin bolted to the coach body.

The bogie brake is a pneumatic disk. Each wheelset has three brake units. One of the two bogies for each coach is always equipped with a store-lock brake. The bogie equipment includes wheel unit cleaners, speed sensor for anti-slip protection, temperature sensors for axle bearings, axle collectors, and the front bogie of the drive coach is moreover equipped with flange lubrication and sanding equipment.

### REALIZATION

**CONVENTIONAL BOGIE FOR ELECTRIC DOUBLE-DECKER UNIT 575**

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