

EVO1: THE REMARKABLE NEW TRAMCAR FROM PRAGUE

Czech consortium Alliance TW Team consists of engineering specialist PRAGOIMEX, rolling stock builder VKV Prague, and Krnovské opravny a strojirny, which provides the basis for construction, reconstruction and modernisation of tramcars. Established in 2001, Alliance TW Team has produced over 500 assembled vehicles and tramcar bodies.

Its latest vehicle, the *EVO1*, was presented at the Czech Raildays 2015 event in Ostrava in June, with positive feedback from industry professionals and the public in the recognition of an all-new, single-section, low-floor tramcar with fully-pivoting bogies using fixed axles.

The *EVO1* is based on a recognised gap in the market for a 15m low-floor single-section vehicle – a class with a great tradition through the years of CKD Tatra – that fits the operating conditions of small and medium-sized cities perfectly, but is also able to effectively provide a service in bigger cities where issues often concern increased service intervals rather than overall passenger capacity. Capable of running in coupled units, it also serves a valuable purpose for lines that experience varied passenger loads in peak and off-peak times.

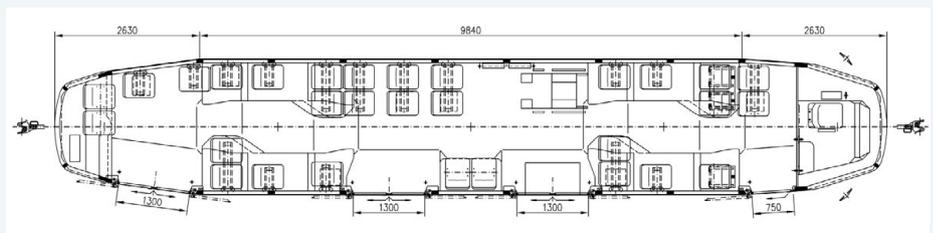
An innovative design concept

The *EVO1* is the smallest representative of the modular *EVO* vehicle type, using a single-section fully low-floor design that features two fully-pivoting bogies (Bo'Bo') and an overall length of 15.1m. The low-floor platform was a cornerstone of the new design, with a door access height of 350mm above the top of the rail and internal sections over the bogies at a height of 500mm. Transitions between different floor levels are with gently inclined surfaces, meaning a step-free interior.

The twin bogies each use a pair of fixed axles, each driven via a helical gearbox and 65kW asynchronous traction motor, mounted in parallel to the axle; they are also equipped to capture stored braking energy, with independent ventilation. The outer bogie frame and cradle suspension consists of two pairs of helical springs with vertical hydraulic dampers and magnetic track brakes, while 610mm-diameter wheels underwent separate development to ensure reduced noise.

Microprocessor-controlled asynchronous traction equipment allows for electrodynamic braking to recover energy back into the power grid. Both the traction motors, including standby electric brakes, are controlled separately; additional electrical equipment allows for multiple-operation coupled sets.

The tramcar's skeleton consists of a welded steel frame with glass-fibre body panels that are glued to the frame and a roof constructed from a sandwich laminate. The overall design is simple and timeless in both the exterior and the interior. In a right-hand driving configuration the tramcar's side features four sliding doors: one 750mm front door and three 1300mm double doors along the side, providing fast boarding for all passengers.



The body strength and impact resistance were validated through simulations carried out by the Institute of Applied Mechanics in Brno, confirmed through crash testing which revealed the expected impact resistance without significant damage to the vehicle. The construction and testing process involved significant co-operation with Prague public transport operator Dopravní podnik hlavního města Prahy a.s., whose workshops were used for completion of the prototype, proving our ability to work closely with customers.

What the *EVO1* offers operators

- A choice of arrangements in vehicle length, passenger capacity and coupling, making it suitable for small and medium-sized operations, but also for larger networks.
- Two fully-pivoting, fixed axle bogies with double-sprung suspension and 610mm wheels. This brings low axle loads, reducing wheel/rail wear and offering smooth turning of the wheel profile. The first bogie features an integrated device for flange lubrication, again helping to reduce wear and wheel noise.
- Microprocessor-controlled asynchronous electric traction equipment, reducing maintenance costs and energy consumption.
- A layout with four doors that align with the platform edge at 350mm. With no steps the *EVO1* allows for the smooth boarding and alighting of passengers with restricted mobility.
- Identical window and door dimensions mean no major structural interventions are required to produce a bi-directional version.
- Onboard equipment includes high-efficiency air conditioning and heating systems for optimum passenger comfort, as



- well as high-quality seating and passenger information systems with LCD displays.
- Electrically-operated pantograph with anti-shock sensor, exterior and interior CCTV systems, pneumatic sanding systems and ergonomic drivers' cabin arrangement.
- The *EVO1* is designed with co-operation with transport operators in mind, using an approach that allows for modular construction at the undertaking's workshops. This enables operators to reduce procurement costs, and assists with simplified and future preventive maintenance.
- Constructed using components mainly produced in the Czech Republic, the *EVO1* can be offered at a unit price lower than the average of European manufacturers. **TAUT**

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