



Ing. Ivo Malina, CSc.

**Slovo úvodem
By way of Introduction**

doc. Ing. Karel Sellner, CSc.

**Porovnání systémů vozidel s naklápěcími skříněmi
A comparison of car systems with tilting body casing**

This contribution sums up the key requisites and conditions for fast and effective passenger railway transport. It sets out the main reasons for the introduction of the system of tilting body casings, the categorization and characteristics with natural and controlled tilting. They are described in more detail and illustrated with schemes and comparisons. In conclusion, the prerequisites for the further development of this system in passenger railway transport are given.

Ing. Andrea M. Parnigoni

**Vlak s naklápěcí skříní "PENDOLINO" zavedený za účelem zrychlení provozu
na stávajících tratích
Tilting-casing train PENDOLINO introduced to accelerate traffic on the existing
tracks**

You will find in this article:

1. Something from the history of tilting technologies
2. The Pendolina by Fiat (now ALSTOM Ferroviaria)
3. The Pendolino 680 for the Czech Railways

Ing. Alessandro Elia – Ing. Federico Albert

**Přehled techniky naklápění vozových skříní
Overview of technologies using tilting casings**

This contribution introduces the objectives and basic functions of the tilting system. To increase travelling speed on the railways, in particular in passenger transport at medium distances, two alternatives are available: Either invest in new high-speed systems, including specialized tracks and specialized cars, which can guarantee on ordinary tracks behaviour similar to that of the existing vehicles, or invest mainly in cars using tilting technologies and thereby limit investment in the infrastructure and the impact on the environment and guarantee a substantial improvement of travelling speed.



The article also describes the principles and fundamental theories of the tilting systems and quantifies on the basis of the actual figures the improvement of travelling speed and gives the limits for their safe application.

Ing. Alessandro Elia – Ing. Federico Albert

System Pendolino The Pendolino System

The objective of tilting systems is to optimise passenger transport, shorten the driving time and improve comfort, with a view to the safety of driving and the stability of the rails. To increase track speed in an arc it is necessary to rely on tilting technology and to design cars with outstanding behaviour in an arc according to the existing design parameters and the quality of the geometry of the rail. To increase track speed on a straight track it is necessary to ensure sufficient traction output, comfort, and especially the stability of the operation, according to the quality of the geometry of the track.

A tilting system must meet with the same priority different requirements. It must respect the rules of driving safety, protection against derailing, the forces causing transversal movement of the rail, the maximum stress in the rails from transversal and vertical forces, stability in operation, the rules for the quality of operation, driving comfort, limited wear on the profile of the wheel and rail, and all the operating rules.

This contribution presents the results and experiences obtained with the Pendolino over twenty years of tests throughout Europe.

Ing. Ferdinand Gottmann – Ing. Josef Novotný

Stručný popis elektrické třísoustavové sedmivozové jednotky s naklápěcími skříněmi řady 680

A brief description of electric three-system seven-car unit with tilting casings 680 series

This contribution is a brief description of an electric three-system unit with tilting casings of the 680 series. It is accompanied in this digest by a contribution dealing with the maintenance of the unit.



Ing. arch. Patrik Kotas

Interiér a exteriér vozidla řady 680
Interior and exterior of the car of the 680 series

This article deals with the overall conception of the exterior design and the interior of the train unit of the 680 series for the Czech Railways. It contains an outline of the development of the project, including the conditions that affected the contours of the train. It explains the resulting colour scheme in the train's interior and describes the key elements of the interior, including the colour scheme and the materials used.

Ing. Libor Lochman, Ph.D.

Vlak CDT 680 a ERTMS
The train CDT 680 and ERTMS

The Czech Railways are preparing for operation in the first corridor a new three-system unit of the 680 series with tilting casings. This unit is expected to be used in particular on the line Berlin – Prague – Vienna. It has to be fitted with the corresponding signalling and safety equipment on board. The article analyzes the current and expected state of the signalling and safety equipment in this branch and the ensuing demands for the on-board signalling and safety equipment.

doc. Ing. Karel Hlava, CSc.

Trakční napájecí soustava pro vozidla řady 680
Traction power supply for cars of the 680 series

This article analyzes the relation between the cars of the 680 series to the power system of the Czech Railways. It deals with the collection of current by the collectors from the trolley line, the electric parameters of the trolley line, electromagnetic compatibility of these cars with the power system, and the question of recuperation braking. Numeric examples substantiate the benefits of the conception of traction circuit in the cars of the 680 series to the cars with diode traction exchangers that are still in operation.



Ing. Vladimír Igielski – Ing. Ladislav Kopsa

Kolej pro vozidla s naklápěcími skříněmi
The rail tracks for tilt trains

The acquisition of tilt trains of the 680 series has become reality – exact terms now exist for their supplies. This article summarizes the activities to date of the Czech Railways in the preparation of tracks for the corridors of the Czech Railways for the operation of these units. It notes the broader aspects of the interaction between the rail and the tilt cars and mentions some key aspects of the introduction and maintenance of the smooth and safe operation of these units.

prof. Ing. Jiří Izer, CSc. – doc. Ing. Jaromír Zelenka, CSc.

Modelování chování vozidla řady 680 na trati 1. národního koridoru
Modelling the behaviour of a car of the 680 series on the track of the first national corridor

This article describes the method of modelling the operation of a unit of the 680 series on a concrete section of the corridor of the Czech Railways and the height and direction divergences of the railway tracks. It presents the results of simulations, focusing on the interactions between the car and the rail at different speeds leading to the values of insufficient super-elevation within the range 195÷330 mm. It alternates the driving contours of the wheels and the parameters of the coupling of the wheel set in the undercarriage frame.

Ing. Lumír Gregor, Ph.D.

K provozu elektrických jednotek řady 680
The operation of the electric units of the 680 series

This article focuses on the operation of the electric units of the 680 series. The first part of the article demonstrates the benefits of tilting car casings, comparing a unit of the 680 series with a train consisting of classical cars on the line Česká Třebová – Choceň. Another part of the article deals with various malfunctions that may occur in the operation of a unit of the 680 series and the effect of such situations on the overall driving time and the circulation of the units of the 680 series. Apart from technical defects of units of the 680 series the article mentions the effect of defects on the track (in particular, track closures).



Ing. Jiří Rambousek

Výhledové nasazení vozidel řady 680
The future deployment of the cars of the 680 series

These factors are crucial for the introduction of a new product represented by the 680 units in the system of long-distance international transport:

- a. the choice of the right proportionally balanced and harmonious set of tools, the so-called marketing mix,
- b. the compatibility of the new product with the production of the neighbouring railway transport operators.

Ing. Josef Novotný

Údržba elektrických třísoustavových jednotek s naklápěcími skříněmi řady 680
The maintenance of the electric three-system units with tilting casings of the 680 series

This article describes the use of back-ups, diagnostics and reliability in maintenance and repairs of the electric units of the 680 series.