



ACADEMIC YEAR 2010 – 2011

TITLE OF DIPLOMA THESIS:

Basic planning and selection principles for railways bogies – Technological
advancements and market research

AUTHOR: Chronis Evaggelos

ABSTRACT

This paper presents the basic principles of the railways bogies selection and design running at various speed networks. In addition presents the technological development and the bogies market research. The modern trailer vehicles usually have two bogies. In cooperation with the wheelsets, they allow the vehicle smooth negotiation of curves and guarantee its stable running on straight paths. They transfer the vertical loads from the car body to the wheelset and help the better distribution of the forces on the rails. Finally they limit the vertical and lateral oscillations of the vehicle, securing a tolerable level of dynamic comfort to the passengers.

Each of the three main parts of the trailer vehicle, the car body, the bogies and the wheelset is connected to the others by means of a system of elastic connections and dampers creating a suspension at two levels (car body-bogie and bogies-wheelset). The elastic bogie wheelset linkage may be achieved using various technologies and materials (spiral springs, rubber sheets, phylloid springs, pneumatic cushions, etc.)

The choice and design of bogies depends directly on the functionality of the vehicles to which they will be mounted and on the geometrical and mechanical characteristics of the track on which they will run. The good construction of the superstructure does not guarantee by itself the smooth motion of trains and the achievement of the desirable performances. It must always be combined to the appropriate design and the good manufacturing of the rolling stock. The geometrical and technical characteristics of the bogies that substantially affect the dynamic behaviour of the vehicles are the rigidity of the primary suspension springs, the bogie wheelbase, the wheel diameter, the weight of the bogie, the equivalent conicity of the wheels (γ_e), the car body weight, the vertical rigidity of the secondary suspension springs and the damping coefficients of the secondary suspension dampers.

This paper examines the qualitative influence of the vehicle constructional parameters on the critical speed performance on straight path and in curves of conventional bogies, of bogies with self-steering wheelsets, of bogies with independently rotating wheels and the bogies with mixed system. Finally it is suggested, according to the predefined speed and alignment layout of track, the technology and the constructional parameters of the bogies.



KEYWORDS

Conventional bogies, Bogies with self-steering wheelsets, Bogies with independently rotating wheels, Equivalent conicity of the wheels, Rigidity of the primary suspension