Extended Abstract


The research and development of new alternatives for the improvement of urban transportation of passengers has dizzily increased all over the world.

The population growth is the biggest difficulty for the creation of new lines in dense urban spaces provided with consolidated constructions and equipments, has been lately forced to a more intense search of innovative solutions suitable to these scenes present in big cities.

New concepts resulting from the problems experienced today by urban transportation, has grown stronger, according to time, hierarchy of values and contemporary mentality of our society. In this sense, the efficiency in urban transportation has been related to the existing integration of means of transportation, that is, the more numerous forms and options of transporting, the easier and more comprehensive solutions has been found.

In view of the new transportation needs, public and private companies have been considering a new way or option on the passenger transportation modality, using an elevated track. The elevated road complements the possibility of an underground via (subway) or via in the level of soil (streets, avenues, etc...), frequently as the only viable alternative so as to avoid expropriations, demolitions or even the use of alternatives highly restrictives to the use of street space by the pedestrian and other more noble public services, being applicable where it is not possible anymore to improve or vitalize urban transportation for lack of physical space at ground level and due to the high cost of via underground.

Presently, the elevated roads are the cheapest and rational mode to obtain an exclusive road, free and independent from any obstacle or other elements installed on the ground level, adaptable to any type of geometry or geometrical
accidents (ramps, curves, transitions and railroad switches), allowing an automated regular operation and of high speed.

In Brazil, the concept of means of transportation through an elevated road can be represented by the Aeromovel System, invented by Oskar Coester, an engineer from the South, based on the principle of inverted boat sail. It is constituted by a vehicle whose movement is obtained by a system of pneumatic propulsion, through industrial fans of high energetic efficiency and low power, triggered by stationary engines compressing atmospheric air inside the elevated track and boost a metallic plate (similar to a inverted boat sail), located in its interior and interconnected to the passenger vehicle on the elevated track. The stationary engines are located next to or close do the passenger stations.

Each interval between two passenger stations forms, generally, a circuit of propulsion, separated from the adjacent intervals through interval insulation valves. Several different arrangements of fans and control valves may be employed as needed.

The adopted propulsion system provides an extreme lightness to vehicle eliminating the embedded presence of electric motors, grinding systems and control of electrical current and voltage and other subsystems, characteristics of the traction applied to the wheels of vehicles.

The primary energy of the Aeromovel System is electricity. The propulsion system can optionally operate with gas or diesel engines in the event of a power outage.

In case of power outages, system downtime for other reasons, or in emergencies, passengers may use the road as a runway or access to the nearest station safely since the rails are powered with low voltage, without presenting danger, electrical shock or damage to people if they are reenergized.

Compared with other transportation systems, the Aeromovel System require much less maintenance due to simplicity and robustness of the components parts. The reduced number of system components and the use of market standardized parts makes maintenance possible without exclusive dependence of specific component suppliers or even import parts.

All critical elements for system operation are specifically designed and manufactured to be easily and quickly replaced by spare components. According to the complexity and length of the line, the maintenance of the vehicles can be
performed in the stations themselves, given the simplicity and features of the installed systems.

The Aeromovel System, as it uses electricity, does not pollute the air, being therefore compatible with government energy programs aimed at optimizing costs and improving the quality of the environment.

The noise generated by the vehicle is reduced, below the established levels for urban transport systems in developed countries, since it does not carry engines on board, being automatically eliminated the vibration and noise arising thereof, which does not occur on conventional systems under rails.

The impact caused by the elevated track is lower than in the conventional systems. The lightness of the vehicle holds a road of reduced dimensions, allowing the growth of trees and bushes under the same.

The minimum clear height of the elevated road, usually established by municipalities from 4.5 to 5 meters, allows the development of activities on the ground level with little restraint and minimum influence on ventilation, natural lighting and type of use of the physical space under the road adjacent the same.

The main constituent building blocks of the elevated road, pillars and beams are usually pré-manufactured in concrete and / or steel and then assembled with the aid of cranes, allowing a national project, planned and optimized in its various aspects.

The Aeromovel System had its first patent granted in 1977 by England, later also recognized by Japan, Germany, USA, Brazil and others.

In 1989, the technology was exported to Indonesia for US$ 10 millions and installed in that same year successfully in the city of Jacarta, capital of Indonesia. The Jacarta Aeromovel System is built with a circular line of 3,2 kilometers built inside an ecological park that houses convention centers, theaters, hotels, etc, operating up to present days without any accidents and with excellent efficiency, having transported more than 20.000.000 people up to the moment.

In 2013, a line started to operate commercially, after years of outages, connecting the train station “Airport Station” to the Salgado Filho International Airport, with an extension of 814 meters. This is the first line of this modality of transportation being used commercially in Brazil. The line is being in progress managed by the company Trensurb of Porto Alegre.
Currently, there are Aeromovel System implementation projects in progress in the municipalities of Canoas-RS, Nova Iguaçu-RJ and Campos-RJ. Moreover, in the state of Rio Grande do Sul, in the city of Porto Alegre, it is also under study the implementation of one more line of approximately 18 km, connecting the Trensurb Market station to the Restinga, in the south of Porto Alegre, passing a good part of the path through the Guaíba River waterfront.

In the municipality of Rio de Janeiro, as part of the Project of urban mobility for the 2016 Olympic Games, Line 4 of the Subway has been being built that will connect the neighborhoods from Ipanema to Jardim Oceânico in Barra da Tijuca.

In this project, where the extension of Line 4 to the BRT Alvorada Terminal should have been considered, due to the volume of expected passengers and to avoid unnecessary passenger interchanges, the connection to the mentioned terminal will be done through the BRT Line 0, that will certainly not be sufficient to absorb so many passengers.

A solution that could have been evaluated would be the connection of the above mentioned space by the Aeromovel System, whose economy and capacity would certainly be superior to the BRT vehicles besides the aspect related to security, as it is a means of transport for elevated track, would avoid the majority of deadly accidents caused up to the moment by that type of transportation.

**Keywords**

Elevated Tracks; Pneumatically Propelled; Industrial Centrifugal Blowers.