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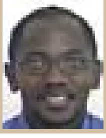
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Noteworthy advances in passenger rail transport

Some implications for South Africa

Some of the latest developments in passenger rail technology presented in the article are worth noting by the South African civil engineering profession. While some may appear far-fetched, the article outlines the potential of rail in properly developed urban areas

PASSENGER RAIL TRANSPORT: A DEVELOPMENTAL SIGNATURE

At a time when South Africans are still debating the merits of the high-speed Gautrain, China seems to have realised that passenger rail transport is a basic requirement for building and sustaining big cities. Also, while South Africa is drowning in a sea of unimplemented transport plans, strategies, perspectives, charters and frameworks, the Chinese are increasingly becoming the envy of the developed world through 'learning by doing'. The unprecedented rate at which they are implementing passenger rail networks is evidence of this.

Passenger rail transport is a developmental signature of the big cities of the world, to the extent that the functioning of these cities without rail is almost unimaginable. While satisfaction with train services varies from city to city and from person to person, investments in rail have shaped lifestyles in these cities and provide city dwellers with the basic mobility to access essential amenities. Also, city dwellers experience a sense of ownership through their ability to explore their cities.

These transport modes – especially the high-performance modes – are able to satisfy relatively high travel demand more efficiently, hence their suitability for large and densely populated urban areas.

RAIL TECHNOLOGY IS EVOLVING

Credit is due to manufacturers such as Bombardier Transportation and Alstom, as well as numerous research organisations around the world, for exploiting the full potential of rail technology. Generally, the quest has been the cost-effective development of efficient and cleaner technologies that ensure higher travel speeds and improved passenger comfort.

While high-speed trains using more mature technology reach operating speeds as high as 200–300 km/h, magnetic levitation transport (maglev) can reach speeds of more than 500 km/h. For example, the 30 km maglev running between Pudong airport and Longyang station in China operates at a speed of 430 km/h. (Rail speed records are continuously being broken around the world, however, and on 3 April 2007 a French high-speed TGV reached a top speed of 574,8 km/h.)

Maglev technology has been in development for almost the past three decades and is now commercially available, and further developments are producing numerous variations. The basic design philosophy, however, is based on the use of electromagnets for non-contact levitation and propulsion of the train along a fixed line. The technology can accommodate grades as high as 10% and sharper bends, typical of some of the South African terrain. The efficiency of the braking system ensures minimum time wastage at stations and passenger comfort is not compromised, to the extent that no seatbelts are required and passengers are free to move around in the cabin at any travel speed.

Developments in high-speed wheel-rail contact trains have been producing ever-higher travel speeds and lighter trains. Passenger discomfort around bends is being addressed by the use of tilt technology. The ability to operate on some pre-existing tracks – albeit at reduced speeds – is an added advantage.

Light rail transit systems are often preferred to high-speed trains because of their ability to operate in different right-of-way environments and to enhance urban aesthetics.

Automated guided rail technology has also come of age. These systems are unmanned and save on operating costs as a result of reduced labour and fleet scheduling optimisation, although capital costs are relatively high.

Examples of conceptual technology are so-called tubular trains and free-gauge trains. Tubular trains do not run on rail and have no wheels or engines. The rails are attached to the train itself and the train runs through mounted rings equipped with wheels on which the train moves. Proponents of the tubular train concept believe that, once developed, this technology will be relatively cheaper than conventional high-speed rail and maglevs, with little environmental damage. Free-gauge trains, on the other hand, are conceptualised to run on different types of track gauges, thus making it easier to integrate services. While not a new concept, personal rapid transport systems have taken the idea of demand-responsive transport further. In this system, small automated rail vehicles – the equivalent of a light passenger car – run on elevated rails and are used when service is demanded by a passenger or a small group of passengers.

TECHNOLOGY AND BUSINESS MODELS

Although numerous new rail technology patents are being developed, the critical issue is to adopt the technology to render quality passenger transport services to customers.

In South Africa, where the drive is towards the refurbishment of existing rail infrastructure, the adoption of most of the latest technology should probably not be expected. However, the situation could alter if the South African public passenger transport environment becomes an attractive investment option for the private sector. For example, some European countries are exploring the use of high-speed trains over long distances as an alternative for domestic airlines services, based on the total service package offered to customers. In South Africa, the recently unveiled intention to construct a high-speed rail link between Johannesburg and Durban could be pitched at this level amidst tighter airline regulations, which are creating rather hostile services. This specific project, however, has also sparked debates around government's transport intervention priorities.

Many large rail projects have often fallen short of meeting their financial projections and ended up receiving operating subsidies from governments. Their implementation appears to be more politically driven than technically driven. The Chinese have attempted to reduce implementation costs by focusing on developing manufacturing and implementation skills internally and using local resources as far as possible. In South Africa, the nature of land use patterns and populations densities are such that for some time to come, high-performance transport modes will by default require operating subsidies to make them attractive to the average South African user. South African transport systems have historically been – and still are – reliant on some form of subsidy.

Above: Tubular train concept. Source: Damninteresting.com
Right: Magnetic levitation train. Source: Transrapid International-USA

THE SOUTH AFRICAN REALITY

From a rail passenger transport perspective, getting the basics right would be the first prize in South Africa. These would include:

- Eliminating level crossing accidents
- Training rail security officials and improving their work ethic
- Offering improved pedestrian infrastructure design and delivery to pedestrians accessing rail stations
- Accepting that the provision of adequate railway police is a basic requirement, not a favour to passengers
- Improving train station aesthetics
- Implementing performance-based contracts for rail services

The South African Rail Commuter Corporation recently introduced newly refurbished 10M5 trains with improved customer comfort features. This is a step in the right direction. Similarly, the planned Soweto Express train service, also with customer-oriented features, is worth applauding.

References are available on request

Source:
http://www.saice.org.za/downloads/monthly_publications/2007/CivilEngMay2007/#/0