SKY BUS METRO

Seminar by
K. Deepak Kumar Subudhi
deepaksubudhi456@gmail.com
0501227456
8th sem, ME2-A
Sky Bus metro

moves people and cargo too!
At 100 kmph along existing roads & aesthetically, without demanding road space!
Better performance than underground metro at one-fourth cost & up and ready in two years
Futuristic automated driver-less operations!

—

Sky Bus concept first presented by B. Rajaram in 1989
At Bologna University Italy

“Technically sound..”
Dr. APJ Abdul Kalam
Cities are getting choked

• Existing metro solutions are:
  – financially unviable and
  – further will add to long term misery
  – Makes states & people poorer

Old generation financially unviable metros re-packaged draining people’s wealth
Evolution of Sky Bus..
Result of 150 years of experience of railways!

The railway on bridge comfortable!

Sky Bus has
The same rail tracks.
The same bridge
The same driving bogies

Only coach is now Suspended, better stability- positive
Hold provided

Noise is positively Entrapped
Surface, elevated or underground metros - not safe enough

Derailments/capsizing kill people

Sky Bus no derailment & No capsizing - SAFEST in the world
Aesthetic, Futuristic Eco-friendly Economic & Safest Sky Bus Metro

Why Sky Bus saves 50% to 75% in costs!

Conventional railway provides for heavy steel coaches to protect people from derailments and capsizing. So carry more steel and dead weight instead of people.

With total weight of 48T, a railway can carry only 70 persons in 20m length.

Sky Bus has no such problem; no derailment nor capsizing; hence uses very light weight coaches and carries more people using much less dead weight.

Sky Bus with the same weight & length carries 300 persons comfortably.

So Sky Bus requires Only 50m long stations to service 900 persons every 40 sec. While existing metro system need 200m and 90 sec.
DESCRIPTION

Heavy 52/60 kg /m rails placed at standard gauge floating elastic medium and damped by inertia of measured mass held in a 8 mX 2m box enclosure, supported over a 1m dia. columns spaced at 15 m and located at 15 m distance from each other, in the divider space in between lanes on a road- way, at a height of 8m above road surface- provides the support and guidance for powered bogies which can run at 100 kmph, with the coach shells suspended below, carry passengers in air conditioned comfort, can follow existing road routes, while existing traffic on roads continue
The fixed structure at 8 m height above road level is aesthetically pleasing and there is no concern of claustrophobic feeling for road users.

Aesthetic and eco-friendly, the Sky Bus can never derail, capsize nor collide- by design as well as by construction, hence is safer than existing rail-based system. With no signaling and having no points and crossings, it is a unique mass-transit system, which can be put up within two years in any crowded & congested city.

Sky Bus metro falls under tramway category, under Art 366(20) of Constitution of India, since it operates along existing roadways and within municipal limits, hence excluded from Indian railway act.
WORKING PRINCIPLE

• Standard railway coach running on railway track

• The under frame with standard railway wheel set running on railway track
The under-frame remains same, railway wheels run on the same track, the coach is firmly attached to the under-frame positively.

The under-frame with wheels and railway traction motors & railway track enclosed in the concrete box- travel on the railway track, carrying the coach below outside the concrete box- now the coach and the track are positively held together- cannot escape from rails!
Video
COMPONENTS

The various components are designed so that to keep the sky bus moving without any defect and to give the passengers the ultimate comfort along with other luxurious facilities which they can not get in the local buses or in trains.
Sky Coaches

The traverser arrangement

Sky Station

Sky Coaches
Salient Features

- **Standard Gauge Rail tracks**: 60 kg rails fitted with double elastic fastenings, with Standard Gauge on sleepers designed & tested for 20 t axle load norms forming maintenance free tracks.
- **Driving bogies**: 100 kmph standard gauge 12 ton/14 ton axle load powered bogies - same as used in metro rails with 4x110/115 Kw asynchronous 3 ph AC motors with power-regeneration and capable of peak 1.3m/sec/sec acceleration
- **Braking**: Electrical re-generative braking, coupled with compressed air disk mechanical brakes and emergency/ idling mechanical brakes for stabling.
• **Crushing load for underframe**: Underframe - fit to take crush loads of regular main line coaches - more than 70t

• **Train unit**: Each train unit 20m long with two driving bogies - the coach divided into 2x9.5 m long buses connected through vestibule door

• **Capacity of 20m long train unit**: Each Skybus unit 20m long having two compartments (3.25m x 9.5m) of 9.5 m, can carry almost 400 persons at 7 persons/sq.m density peak. The 20m units can be attached to form a 3 unit 60m long train of 1200 persons capacity
• **Signal & train control:** Simple three aspect signal system driven by line of sight by motorman, with additional unique safety layer of Raksha Kavach, capable of providing 40 sec headway- but planned 60 sec.

• **Route Capacity:** A Sky bus route can thus be designed even at 60 sec headway, to carry 20,000 to 70,000 passengers per hour per direction in peak period.

• **Security and safety:** Continuous computerized central monitoring & control with provision of audio/visual access for each coach for security. Distributed intelligence systems with redundancy to provide protection against swinging under wind loads/emergency localized control/ prevent over-loading/ emergency evacuation guidance.
• **Track changes and reversals at terminals:** The reversal for the Skybuses at terminal points, to change tracks or go to depots happens through traversers- mechanical auto driven systems capable of handling 60m consists of Sky bus units.

• **Stations-elegant and small:** Stations are 60m long to handle three units of Sky bus, covering next 25 years of requirements-though initially only 20m length is needed.

• **Easy Access:** Access is from existing footpaths, **climb limited to 6 m for passengers**- within 500 to 600m from wherever you are on the road having Skybus route.
• **Turning radius & gradient:** Can be designed for 20m radius of turning radius, and vertical lift, if needed- thus we can avoid totally demolition of any built up urban property, if needed.

• **On line maintenance of rolling stock and tracks:** Maintenance is through continuous monitoring of vibration signatures, and directed by need automatically by computerized systems- much more advanced than existing manual inspections only and periodic checks. All the sub-systems /elements are to existing UIC/Indian Railway codal practices applicable to railway transport.

• **Cargo handling capability:** Cargo of standard containers are automatically delivered and cleared into and out of city.
• **Safety Certification for Public carriage:** Will carry international class safety certification by renowned world class safety certifiers. Guaranteed against derailments and capsizing- making it a unique railway, where coaches can never escape the tracks.

• **Terminal concept:** Current concept of a railway terminal replaced in this "grid" system, by a multi point distributed discharge and access- almost eliminating inter-modal transfers. Each station designed for handling whatever commuters can arrive on a 4m wide foot-path- with waiting time less than one minute.
• **Land requirements for route, stations and at depots:** All along the route the alignment is typically located on the median (1.2m diameter columns at about 20m spacing) of the road, needing right of way at 6.5m above the road, the fixed structure carrying railway tracks located at about 11m - thus avoiding claustrophobic effect for road users. Typical road widths normally of 10m all along and at station locations 20m width for 60m length desirable.

Depots will be outside the urban areas, needing about 25 hectares land for services for every 10 km route.

Stations are located with access from existing footpaths, and over and above existing roadways, none of them longer than 60m to cater to next 100 years of requirements.
- **Power requirements**: Typically for tropical climate conditions, for a module of 10 km route, 15 MW power needed covering traction and all services including comfort air-conditioning loads at stations.

- **Quality of service and pricing**: With access within 500 to 700m walking distance, air-condition travel at 100 kmph, service available at less than a minute during peak hours, priced at Re 1.50 per km falling to Re 1 for regular travels with lead of more than 7km can be provided. typical) (year 2005)- if rider ship per a 10 km route is a little more than 3 lacs per day.
Sky Bus is affordable & adds wealth!

<table>
<thead>
<tr>
<th>Cost estimation:</th>
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<tbody>
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<td>Reduces cost of transport with quantum jump in quality of life</td>
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<tr>
<th>Capital cost for a 10 km route</th>
<th>Rs 500 cr</th>
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<td>Annual Capital service charges</td>
<td>10% 50</td>
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<tr>
<td>Annual Operation &amp; Maintenance</td>
<td>10% 50</td>
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**Expenditure**  
Rs 100 cr

**Revenue**

At Rs 500 per month 2 lac families 120

(A family gets 3 travel cards to avail 1000 km in peak period and 1000 km in non-peak period. Virtually 25ps/km!)

Floating Population 50000 at Rs 50/day 90

**Revenue from tickets**  
Rs 210 cr

**Operating surplus**  
Rs 110 cr 22%

Suppose only 50% of projection materialises even then a minimum of 10% return is assured.
Comparative Costs for a 10 km route to carry 40,000 pass/hr:

- Underground Metro.......................... Rs 2,500 cr
- Elevated Metro.............................. Rs 1200 cr
- Sky Bus Metro.............................. Rs 500 cr
SAFETY MEASURES

• Compared to conventional railway systems, the centre of gravity of the mass being carried on the wheels is brought down to be closer to the wheel support- hence dynamic safety is many time improved
• In conventional railway wind can topple the trains. In Sky Bus wind cannot topple- there is positive link between the rail guidance system and the Bus Coaches- with 400%
• The railway bogies in conventional system have propensity to lose control on derailment, but additional safety in Sky Bus bogie is that we have derailment arresters, which prevents the wheel from jumping off the rails. So we are ensuring that there is no derailment. safety factor built into multiple suspenders
Raksha Kabach

• The chances of collision between two skybuses is nearly zero. Because the well tested anti collision device developed by Er. B. Rajaram called as “RAKSHA KABACH” will be there in each sky bus bogie.

In normal railway systems, when collision takes place, derailment also occurs, and carriages capsize killing people. But in Sky Bus no collision can take place between the coaches— even after the 3 levels of braking fail and the Sky Bus units hit each other in a collision, the Sky Coaches in which people are traveling, will only swing to and fro- but will not collide with each other nor capsize.
But, if there will be any problem occurs in the skybus during its running and it has to be stopped between two sky stations, then there are the safety air bags are provided with each coaches for emergency exit of the passengers in the mid way.
ADVANTAGES

- Fast transportation
- No land acquisition problem.
- No demolition
- No Vandalism
- Fire Protection
- No capsizing
- No Deaths
- Deep Penetration
- Lowest Operational cost.
- No interference with normal road traffic
- Low Capital cost
- Fast Clearance
- Better Capacity
- Flyover
- Fast Execution
- No Pollution
- No Force Major
- No traffic Jams, No waiting
- Comfort
- Easy Access
- Amenity
- Luxury & Comfort
The Skybus is the technology breakthrough that India has achieved. Skybus is an improved railway technology, eliminating the problems of existing metro rail systems, like, derailments collisions, and capsizing crushing people. Old conventional railway men, who remained basically operating and maintenance experts, may take a little time to appreciate, but the fact remains Skybus is an improved railway technology eliminating their fears of derailments and capsizing from which they suffered for decades!

Financially Skybus Metro makes urban transport a dream come true for administrators- virtually free gift to people without Government fund in

What needs to be done is to eliminate the doubting Thomas in our minds, and adopt the Skybus, if we want to really solve the urban transport crisis!. The Sky Bus metro is one single technology which can change the face of our cities, take out almost 10 million road vehicles in the cities and make the cities livable, improving quality of life and attract and sustain economic activity to generate wealth.
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THANK YOU