



Atri Knowledge Embedded Infrastructure Lab. Pvt. Ltd.,

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Doc: AkeiL/3/8/2006

Dt: March 8, 2006

Sir,

Sub: Skybus- the story of liberation of mindsets

Ref: Lr even no dated 7th March2006

The long letter I wrote must have been marked down the ladder. Purposely I had introduced one or two factual errors, minor in nature, in case of conventional metro rail- to discover if any one reads at all, and if they read, will the party justifying the conventional system come back ferociously accusing me that I don't know a bit, so rest of my statements should be discounted!!! (Anyway one of them is the length of station section/ if you take only platform length one can manage with about 250 to 290m platform length.)

Also I did not mention the freak accident that took place when experimental studies were going on. Perhaps, the persons who are supposed to study and put up a note will first pick up on that issue, to condemn Skybus- refusing to distinguish between experimental systems and commercial certified systems!!

Further, please do not forget to ask for guarantee certificate from the conventional metro rail that when the train is running over the road, ALONG the road, the train shall never jump the rails and go down on to the road! You cannot accept the possible argument that, after all trains are crossing roads as rail-over-bridge. The situation is different, when you put a train on top of your head continuously for all the road length! The trains have history of losing control, may be for some valid reason, as history proves. The train traveler takes the calculated risk- but why the normal public traveling on the road should suffer the collateral damage? How do you organize the relief operations with a piled up train and entangled with road vehicles too? Please think out and demand answers. With the advent of Skybus which provides the guarantee against such disaster, you do need to establish why you do not want to demand similar guarantee from the proponents of conventional metro rail. We all have responsibility toward the innocent people who are going to move below the train all along the road.

Please read the enclosed write up, the origin and reasons as well as the need for the Skybus technology which motivated me to innovate. It is as much a story line- and an exciting trip for me, the floor workers of Bharat Earth Movers Ltd/Bangalore, the learned Professor of IIT/Mumbai as well as the young entrepreneur who made the world's largest composite body when he made the Skybus coach in Goa, the company from silicon valley voluntarily contributing to the cutting edge station management software and hardware to assure security, to the civil/structural engineering skilled engineers and companies who came forward to share the happiness- not for money- we have to be grateful to all of them. I kept records of all.

The freak accident forms part of technology development- and we got the proof of the safety features inherent in Skybus when such untoward incident took place. It is covered in the write up.



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Well, finally ideas rule mankind. New idea gets ridiculed first, then when it starts to become a reality, violently opposed by those who lose the benefit of status quo, and finally gets declared as the most obvious choice and many will turn up, "I always thought that was the right idea"! Success has many fathers.

Now it is only a matter of time- the technology is so simple that we ordinary people of India, could make the first prototypes, without Government helping us- and further with a little help, we produced the entire working technology within short period of less than SIX months. We proved the foreign consultants who were advising our own leaders influencing the Government policy, wrong.

The proud satisfied smiles of our Indian workers and engineers when we successfully tested our systems, is a reward I will treasure for my life! I am sure the effort of our workers will not go waste. I believe interest of Indian workers and engineers is as important as those of foreign countries.

Trust me- if you just pause for a while and think from basics what we need for city, you will end up designing the Skybus system yourself!

I must express my gratitude, to those silent but wise people who always encouraged me to continue on my path of walking alone- but I was not left alone; many a corporate body pitched in and many a worker and engineer shared my dream of causing a paradigm shift to the transport scene in the world!

It is our life and what we leave for our posterity must be our concern- do we create wealth and pass on better world- or just impoverish them, for our comfort?

Technology innovations provide the answer to develop our infrastructure without tears! What we must ensure is that the world class safety standards are followed.

Thanking you for your time – this letter is to be read along with my earlier one, please!

Let us trust ourselves!

With best wishes- hoping to see you riding comfortably in India's Skybus to redefine the life in a city!

Yours sincerely,

(B.Rajaram)

Encl: Write up Background story of development of Skybus

Cabinet Secretary/Govt of India/New Delhi



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Skybus-the necessity and background information including learning experience from the accident at Margao test track;

1. Urban habitats are collapsing with congested roads adding to traffic woes in terms of delays, accidents and constant pollution, reducing quality of life for all the urbanites.
2. Widening of roads or fly-overs give temporary relief of hardly two to three years, while making the lives of people harsh by displacing them.
3. Road based and rubber tyred based solutions cannot provide the required relief, as they tend to
 - 3.1. Occupy the road space itself
 - 3.2. In case elevated system, the rubber tyred solutions(like mono-rail –a misnomer- actually load is carried on rubber tyres) technically fail to provide speed and mass transit capability
4. Rail based solution – commonly known as railway- and when constructed in cities called metro rail, is the right solution. For last more than 150 years this technology has provided the solution and many cities in the world used them. After a century Delhi also has the same old technology now in the shape of Delhi Metro- technically and technologically, it is copying what others had done long time back. Despite all the hype being wrongly created as the most modern system, it is a matter of fact that the system is basically the same as Kolkatta metro, executed in India two decades ago.
5. This old technology always suffered from a basic lacuna that when the wheels jump the rails, derailment and capsizing of coaches kill people. This becomes even more serious, if we run the train for long lengths over existing crowded roads, because, when the train jumps rails and falls down on the road, the disaster is even more serious, because not only people in the train, but people on the road too get hurt. Our own experience of trains falling into rivers jumping the tracks, only has to be remembered.
6. To avoid this danger, it is safer to carry the railway underground, in habitated areas, so that any derailment will limit the disaster to those who travel in the train and collateral damage as in elevated railway shall not take place.
7. But the underground railway does have more serious dimensions for disaster management in case of fire, derailment and security concerns- to mitigate the same extensive planning is needed- but cannot guarantee the safety in fool-proof manner. One has to live with the danger. Disasters did take place in the world, with serious consequences.
8. Since the elevated massive structure of metro rail, along with large stations (250 to 300m long) located at only 6 m height above road level- just like fly-over, running along the road creates a visual monster- grotesque and spoils the skyline.



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9. Also the noise pollution is real with sound of running trains being substantial being open and airborne.
10. The conventional metro rail operation further ends up creating congestion problems and in fact forces people to divert from straight point to point movement, to first come to railway station and then travel along a route, change again mode of travel finally to reach destination. Modal shifts add finally to the actual time taken for the point-to-point movement. Further serious terminal congestion problems are to be handled.
11. Even with the above short-comings, only the movement of people is addressed partially- because it does not provide close to point-point service, and feeder services costs are not included in the solution.
12. Further the problem of cargo movement and house keeping services for the city are left out. So current Delhi metro type solution falls short woefully to meet the full requirements of a city. That is the story of all cities having Metros, like London/Moscow etc. and we have only copied the same problem as solution.
13. Society had to accept these dangers, for lack of alternative solution, till now.
14. I for the first time in the world, presented the concept of Sky Wheels, in 1979, in a world congress in Bologna, Italy, solving the problem of railway. Sky Wheels concept further I refined, engineered the details, working on my own, and developed the Skybus Metro technology- basically the same proven railway, but with the deficiency of derailment and wheels escaping the railway track- removed!
15. Skybus technology provides the hitherto missing positive hold between the railway tracks and the running wheels and coaches, so that under no circumstances, the passengers are exposed to the danger described when we use the conventional railway.
16. In the simplest terms, Skybus is the same proven railway technology, only improved now , not to lose control by escaping from the railway tracks. Since it uses the same railway wheels, same heavy rails as in metro rail, and axle loads, carries the same heavy passenger loads, at the same high speeds, using the same signaling and train control system as used in railway. The only difference is that, the coach NOW TRAVELS BELOW THE DRIVING BOGIE, lowering the centre of gravity and still transferring the load to the same loading points on the running bogie having the driving wheels.
17. I have been recognized as the inventor and granted patents by technologically advanced nation like USA, for the improved functionality of the Skybus railway technology, which will not derail and become out of control.
18. So basically Skybus is the same railway technology, only further improved to remove the existing deficiency of railway- uses the same proven railway elements. So every single element in Skybus is as per existing railway standards, and so pre- certified for safety just as much as railway is certified- but further better than railway, in terms of safety.



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19. Further Skybus combines the flexibility of a bus with mass capacity of a railway, to provide integrated distributed transport capacity as well as massive single corridor rapid transport capacity.
20. Skybus technology redefines the way town planners think. Adopts grid concept, giving the least distance travel choice for commuters, and a city can avoid typical terminal congestion problems.
21. First examined by the Principal Scientific Advisor to Prime Minister-then Dr Abdul Kalam along with two other scientists, declared that Skybus technology presented was technically sound and wanted the safety issues to be elaborated more and recommended that in view of vast commercial potential, recommended for taking up the project on “mission mode”, a 10 km stretch by Govt.(year 2002)
22. A voluntary committee of Padma Bhushan Dr Anil Kakodkar, Padma Bhushan Dr P Ramarao, along with the in service Commissioner of Railway Safety (Central Circle) Ministry of Civil Aviation, examined a technical presentation by me, and by bench marking against existing railway, concluded that Skybus has better safety features and recommended that the project should be implemented (year 2002) Ministry of UD was to follow up the PMO orders to implement the project.
23. However some technical experts, of our country, opined against trying out the new development but without recording any technical reasons. (Yr 2003) They stated
 - 23.1. that the system was not existing any where else in the world, untried and untested
 - 23.2. that the concrete structure is technically impossible to construct
 - 23.3. that the Singapore monorail is to be equated with the Skybus proposed and concluded that it was not a mass transit system(mind you rubber tyre system is sought to be compared to Skybus- which is a steel wheel on steel rail based system!!)
 - 23.4. the coach required cannot see light of day even in 5 years etc etc
24. So, since I could not get support from the Government, I appealed to private industries and on voluntary basis, industries, designers, construction companies and Science Tech dept of Govt of India, invested their own funds, to the extent of nearly Rs 4 cr and within 90 days flat, assisted me and worked with me, to put up the full life scale world’s first prototype consisting of actual Sky Station, two coaches, air-conditioning systems, under-frames wheels, and the concrete structure too! **A miracle** happened in our country, which makes me proud that I belong to India!(yr 2003)
25. Then this miracle was appreciated by the then powers of Ministry of Railway- and publicly unveiled on Oct 15th 2003, to the world. Faced with the embarrassment of indifference of Government to their own intellectual work, I was finally authorized to spend Rs 50 cr , as per my request to set up an experimental test track. Authorised in Feb 2004, I completed the 1.6km test track and ran the first Skybus on the Sept 15th 2004- a really moving Skybus first in the world. It is demonstration of our technical



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prowess and cooperation of Austrians Industry(Elin-EBG who gave free 3 ph AC motors and controls), Indian Industry, Tatas,ACC,Essars among many others. This step disproved all the criticism of the experts who first ridiculed. Obviously the Skybus technology threatens the interests of existing metro players..

26. **A freak accident** during experimental stage is cited in layman's language to discredit the system, by detractors. The accident had been inquired into and causes established to show that it was not a case of technology defect but one of the experimental parameters under test caused excessive dynamic forces through combination of forces- further the accident established many positive aspects:

26.1. that the Skybus is really derailment –proof

26.2. that the Skybus in such disaster does not get detached from the track but stays firmly connected to track and no capsizing as in railway takes place

26.3. protects people's lives- in a similar case for railway the damage would have been many fold- only a man holding lightly and close to the door got thrown out and lost life- all others survived the impact of coach with a pillar on a sharp curve- the report was posted in public domain on the internet too.

26.4. after identifying the combination of factors, the design features were revised and further safety tests conducted jointly with RDSO to record the dynamic results.

26.5. in experimental set up there is always a greater risk of accident- but it yields valuable data helping us to see that no such thing may occur in commercially certified product.

26.6. safety certified commercial railway does have accidents- that does not mean the technology is faulty.

26.7. the lobby to promote more expensive metro rail system, mounted concerted whisper campaign – even though the later trials post-accident prove that Skybus has better safety behaviour than the metro rail.

27. Opinions of reputed scientist like Dr Abdul Kalam and Dr. Anil Kakodakar, Dr P Ramarao and working commissioner railway safety, given in writing were proven right in these tests done on the test track.

28. As the inventor leading to world wide patents for Anti-collision and Skybus technologies, in the service of humanity, I have assigned all my intellectual property rights to President of India, through the Konkan Railway Corporation Ltd, Govt. of India concern. So it is clear that I have no personal vested interest, and the benefit of work done by me should reach the common man, is my sole concern.

29. So long I was in service, the official conduct rules put certain restrictions, and I did appeal to all the concerned authorities and also worked against almost inimical atmosphere, to finally successfully put up a working Skybus metro demonstration test track and tested and proved the performance to be better than international standards in dynamics, by the end of yr 2004.



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30. It is to be noted that, the TUV Rheinland Germany, the premiere safety certifying agency in the world, as well as Prime consultants to Government s of Germany, China etc, which already certified the system to be a mature technology for implementation in year 2003, are prepared to certify any commercial implementation of the Skybus.
31. All the matters of fact I brought out, above are verifiable through documentary evidence available in the files of Ministry of Railways, Ministry of Urban Development and Konkan Railway Corporation Ltd.
32. The serious public nature of the case becomes evident if you compare the India's Skybus technology with the currently aggressively marketed Delhi Metro rail.

Solution	Cost per route km	Capacity PeakPHD	Eliminates trucks	Time of completion	Land	Service interval	Financially viable
DMRC type	Rs100 to120cr	20,000 to 40000	NO	7 years	Required substantial	2 min	NO
Skybus Metro Rail	Rs 50 to 60 cr	20000 to 40000	Yes	24 months	Least-minimal	1min	Yes

33. Conventional elevated railway is continued over existing roads then
- 33.1. The traffic moving on the existing roads is under risk of a metro train escaping rails and mowing down the people traveling below.(even in surface railway, Railway Act prescribes safe reserve land either side of track- not just for future expansion but also take care of any train piling up after derailment, so that the accident will not cause collateral damage to others. In a city this is not possible.
- 33.2. the people and properties get dislocated and constant noise pollution introduced.
- 33.3. Capital costs are too much- technology has become economically outdated- and leads to a financial black-hole.
34. Skybus is actually a simple solution using the same railway technologies- hence as much pre-certified as the existing railway- but having some superior improved features and economical too.
35. Skybus technology is guaranteed against derailments and capsizing. But conventional railway is historically prone to escape rail track and no one can give guarantee that such accident will not take place.
36. I urge that our country should take advantage of this breakthrough technology of our country and give safer travel facility to urbanites.