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**STUDY ON APPLICATION OF HIGH SPEED RAILS ON EXISTING RAIL
ROUTES IN INDIA**

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ABSTRACT

Being one of the oldest country in the world to have railway. Indian trains are still moving at sluggish speed giving its users a bad experience whether it is travel or freight transportation. As India has become one of the economic hotspot of the world map. Its railway has been left behind in terms of advancements in speed and safety. So there is serious need to enhance the speed of trains in India to wipe the smear of late trains and become a world class service provider.

INTRODUCTION

The first steam locomotive with two bodies in India was run by (Bengal sappers) of Indian Army in 1851 and 2 years later first passenger train was waved off on April 1853 from Bombay to Thane. Which was one of the earliest in the world and by 1900s India had fourth largest rail network in the world but since then changes in Indian Railway has hardly manage to keep up with the requirements. Today India has a rail network of 117996kilometres over a route of 66030 kilometers carrying 8.101 millionpassengers annually and 1.107 trillion of freight. Which is third largest in the world. Indian Railway is one of the biggest cash cow of government ofIndia. Indian railway generated a revenue of US\$25 billion (2014-15) out of which US\$17 billion was from freight an US\$6.7 billion from passenger tickets. Though being one of the largest organization in the world. Indian railwayhas some of the problems which prevent it from becoming a world class service provider on par with other developed nations some of these problems are

- Slow speed
- Safety

Here our concern is on operation speed of trains in Indian railways

DEFINITION OF SEMI HIGH SPEED TRAINS:

Different countries of worldhave different speed standards. The general classification of trains on the basis of operation speed are as follows

Type of train	Operatio nal speed (kmph)	Average speed(kmph)	Operators
High speed	250-300	200	Shinkansen Ja pan
Semi high speed	160-200	110	WAP-5 locomotives
Expr ess	120-140	70-90	WAP-5 and WAP-7 locomotives

Passenger	90-110	40-60	WAP-4 locomotives
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(Ref:https://en.m.wikipedia.org/wiki/High-speed_rail_in_India)

VARIOUS TYPES OF TRACKS:

A CLASS:

These are the broad gauge sections rated for speed up to 160 kmph. Some sections of these tracks are also contender for very high speed services like shinkasen. E.g.-Most of Delhi -Howrah route, Frontier mail route.

B CLASS:

These rails can allow a speed of 130 kmph.
E.g.- Allahabad- Katni- Jabalpur route.

C CLASS: This is not a speed rated class. It is used for sub urban rail routes of metropolitan cities.

D CLASS:

These are the broad gauge lines have maximum speed limit up to 100kmph.

THE ILL EFFECTS OF SLOW SPEED IN INDIAN RAILWAYS:

India owns 25 out of 50 longest point to point services in the world. The longest point to point service in India is (Dibrugarh to Kanyakumari). Which is 4273 kilometers covered at a speed of 50.4 kmph. Making the travel a nightmare for the passengers. Similar conditions prevails over various sections which makes passengers to choose other transport modes over railways.

1. According to experts, a higher pace of rail expansion particularly high speed rail variety will accelerate India's economic growth by unlocking untapped potential of India
2. The delayed delivery of freight hits financially hard on local industries and thus reducing the expected output

So, all these circumstances presents crying need for development of high speed rail route in India which will prove to be backbone for economic growth of India in coming years.

PRESENT CONDITION OF RAILS IN INDIAN:

India is unique among major world economies as it do not owns a single high speed rail route to transport its freight and people despite increasing demand to do so. There are two methods to do so. One is to construct a new high speed rail system from scratch and the second one is to increase the operating speed of trains over preexisting tracks. Though India being a large country & extremely diverse. It is economically quite harsh to implement high speed rails from scratch.

So, upgrading the already existing tracks and trains to semi high speed will provide a huge relief to the passengers. It will also take less time to transport freight. Which will FastTrack the industrial activities. Which provides a bigger chunk of annual railway revenue.

ADVANTAGES OF INCREASING THE SPEED OF TRAINS:

If the speed of trains is increased. It will result in the following main advantages

1. First some of the earlier traffic lost to Road and air services can berecovered to some extent.
2. The journey time for passengers is brought down to a considerable extent.
3. There is a considerable increase in the track capacity.
4. There is more intensive utilization of Rolling stock.
5. There is overall development in know how and expertise in railway Technology and it ultimately leads to improvement of image of the country at international level.

Looking at the advantages of high speed rails it looks like a fair deal but we need to keep in mind various features before recommending high speed. Various semi speed projects under approval for implementation by government of Indian has been shown in the map given below.

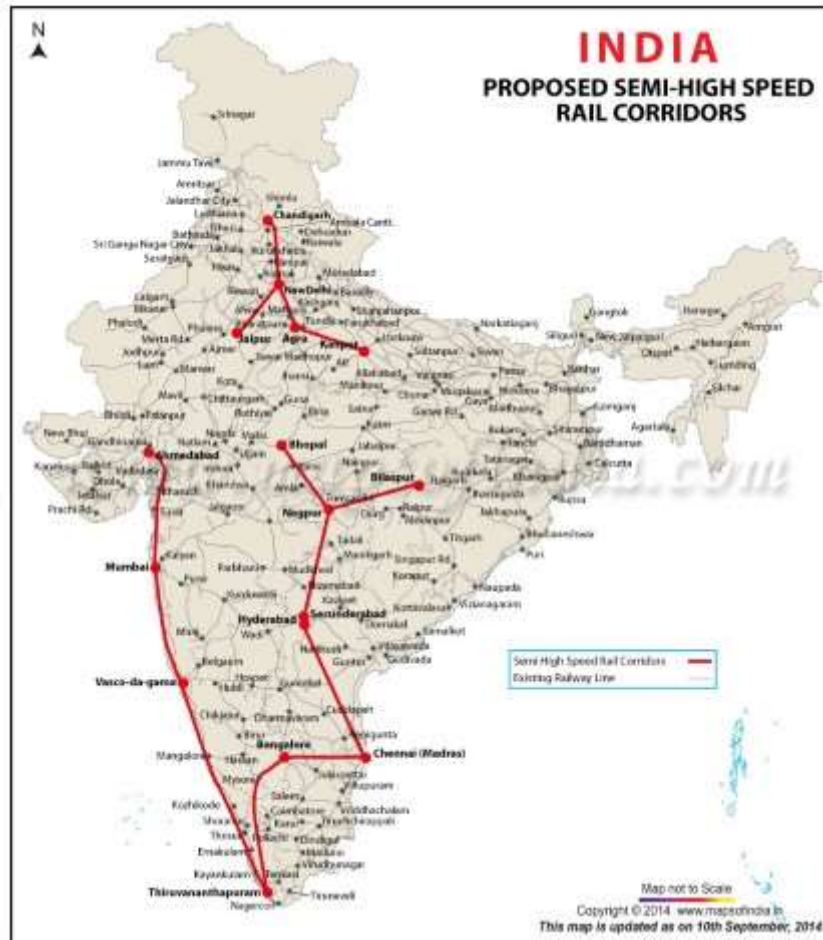


Fig: proposed semi speed rail corridors
(Ref: <http://www.mapsofindia.com/railways/semi-high-speed-rail-corridors.html>)

SOME OF THE PROBLEMS FACED IN INCREASING THE SPEED OF TRAINS:

Brakes and signals:

The conventional brakes and signals need to be improved to keep up with increased speed of the trains.

2. Cattle and trespassers:

It has been a great threat to speeding trains in India as grazing cattle and trespassing by local population leads to serious problems and in some cases safety of trains.

3. Curves:

Curves are one of the major problems for implementing the high speed trains as these curves are designed for the less speed and higher speed trains need larger radius curves with different cants.

4. Deterioration of tracks and rolling stock:

There will be greater wear and tear of tracks and connections due to increased impact and lateral forces. So, tracks will need greater maintenance which will increase the operating cost.

5. Level- crossings:

The level crossings need to be carefully maintained for smooth passage of trains and as we know that there are a large number of crossings in India. Which are unmanned which will pose a serious threat to safe crossing of trains at high speed.

THE ESSENTIAL FEATURES THAT NEED TO BE IMPROVED ARE AS FOLLOWS:

1. The alignment of tracks should be accurate and width of the gauge should be uniform.
2. As radius of curve is a function of speed so, curves should be carefully modified and slipper density should be increased to cope up with the increased forces.

3. Super elevation should carefully designed and applied throughout the curve.
4. As increased velocity will lead to increased creep in tracks. So, creep arresters should be provided on the tracks.
5. The connections should be serviced carefully and fish plates should be frequently lubricated.
6. The worn rails should be removed and long joint less rails should be put instead of short connected rails.
7. The drainage should be well designed and side drains should be kept silt free.
8. The damaged connections should be removed and new connections should be introduced.
9. One of the major problems that comes in increasing the speed of trains that preexisting bridges and culverts need to strengthen to bear the extra stresses coming due to the increased speed.

CONCLUSION

Recent sky rocketing Increase in Population of India as well as its booming economic growth needs a faster means to transfer its freight as well as its people from one part of country to other and a high speed rail will prove to be the most reliable means to fuel its need. After closely studying of requirements and economics involved in increasing the operational speed of trains. One can easily reach to following conclusions:

- a) Developing new infrastructure for high speed trains from scratch can be a costly and time taking affair. India's topography and population encroachments will be a breaker for the project.
- b) The solution to current sluggish operation of train is to increase the current operational speed to semi high speed level by making improvements in present infrastructure.
- c) Application of high speed rails on existing rail routes will provide a FastTrack solution to current slow speed nuisances.
- d) Most importantly increase in speed can be achieved by indigenous technologies as indigenously developed (WAP-5 & WAP-7) engines are capable of reaching 160-200 km/h. This will save our foreign reserves.

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