

REVIEW ARTICLE



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## UTILIZATION OF PLASTIC WASTE FOR SOLVING THE PLATFORM TO TRAIN FLOOR LEVEL MISMATCH AND GAP PROBLEM IN INDIAN RAILWAY COACHES

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### ABSTRACT

Modern express trains in India face the problem of having a higher floor level than the current platform level. It is also seen in new rakes and coaches that there is a substantial gap in between the train floor and the platform. This proves to be a challenge to some people who needs to climb a set of near vertical exterior steps to reach the train floor level from the platform level. Accidents occur when people misstep and fall down in the gaps too. Simple solutions can eliminate this problem. The added advantage is plastic waste management as hard plastic can be used to permanently solve this problem in a quick and cost effective way.

**Keywords:** Indian Railways, Plastic, Platform Height, Train Floor Height, Waste Management

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### INTRODUCTION

In India, the floor height of express and long-distance trains is not compatible with the platform height and changes. In most cases, the distance increases beyond comfort limit of the passengers. The problem becomes more prominent when people struggle to climb aboard and get down from trains on to the platforms because of steep exterior steps which often lead to accidents and injuries. This is mostly seen with small kids, women, elderly, people with arthritis or gout and others and also while moving heavy luggage in and out of the train. The problem aggravates when the train stops only for a few minutes at a station and the number of passengers getting down and up are numerous. This problem causes delay at the stations and unnecessary rush. It is a problem in all stations. The steep vertical steps can prove to be a hindrance in case of a quick rescue mechanism. In all the above cases, a simple construction of platform risers and gap fillers can make a huge difference. Risers can be used to adjust platform to train floor difference and gap fillers to bridge same level gaps between the train and platform.



Fig 1: The floor to platform level in trains is at an uncomfortable level, even with the side handles and the gaps can be dangerous

### THEORY

The maximum gap allowed between the platform and the floor of the train coaches is 342 to 437 mm. The ideal platform height is in the range of 760 to 840 mm. Although this height is acceptable, it proves to be a burden to some of the passengers especially women and children. In some cases it is seen that the gap between the floor of the train and platform is 460 to 470 mm. for at a 760 mm. high platform and 380 to 390 mm. height for an 840 mm. high platform. Both can prove to be dangerous. New trains have modern air suspension systems, in which air springs do not compress much, thereby maintaining the gap at the dangerous level. When raised platforms are in use, the train width must also be compatible, to avoid both large gaps and mechanical interference which causes equipment damage.

It is also known that the disabled have to be carried onto the train in specially designed trolleys or lifters. The use of these devices is time consuming as well as not available in many stations. The procedure needs to be simpler, quicker and which can be performed by one other person.



Fig 2: Disabled people need mobile lifters and devices to get onboard the train coaches

Changing the platform and the train floor height on every platform or train, to make it compatible, is extremely costly and not a feasible solution to this problem. A simple device can eliminate this problem. An inclined ramp with horizontal standing space at the edge, fitted above the top edge of the platform, can serve a variety of purposes and solve all the above discussed problems. In case of same level platforms with gaps, like in some railway platforms or Metro railway platforms, platform gap fillers can be used to bridge the gaps and prevent accidents.

The added advantage is that, the platform risers and gap fillers can be made from hard polymer or plastic and can be used as a means to manage the plastic waste pollution. Non-biodegradable plastic and industrial polymers or even rejected polymer parts can be used to manufacture the platform risers and gap fillers.

## ANALYSIS

The proposed inclined ramp and gap fillers can be fitted directly on top of existing platforms. This ramp and gap filler must be manufactured according to the need of every station. This is because the distance and height of every platform from the train floor or the steps is not the same. Though in most stations, these gaps are more or less the same.

## DESIGN

### Design of elevated platform step with inclined ramp

The elevated platform step or riser is an elevated platform on the edge of the existing platform which takes up very little platform space. It also has an inclined ramp towards the platform and the whole structure sits at the edge of the existing platforms and runs the entire length of the platform. It is made up of any hard polymer material, usually waste plastic, and manufactured in various sizes using the molding and pressing techniques. Thin corrugated rubber sheets can be placed over the risers for added grip and safety. Although it is compact, it does not run the entire platform length as a single piece. It is divided into sections and held in place by long nails or screws. Gaps must be provided in between two risers to act as a drain for rainwater or drains incorporated in its basic design. The platform riser can be extended over the edge of the platform, by a very small amount, in case the gap between the train coach and platform is quite big. In all other cases, it is advisable to keep the platform riser in-line with the edge of the platform. Fig 3 illustrates the proposed design.

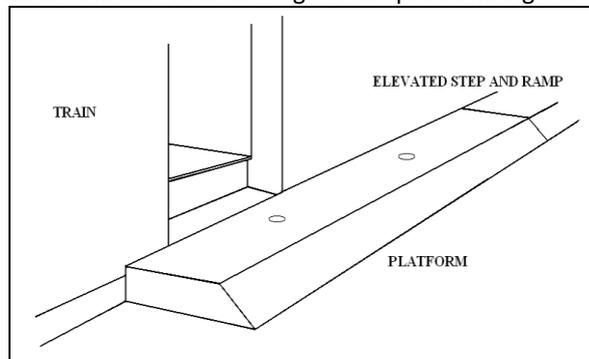


Fig 3: Proposed design of elevated platform step with inclined ramp

The length of each section of the platform riser can be made 23.54m which is a standard length of an LHB coach [1] in Indian Railways. Data must be collected by visual means about the standard gap as well as the height of the platform to train and then the choice of platform riser must be made. It may vary from one station to another.

The new riser will increase the height of the present platform to a new level, which is suitable and comfortable for passengers to get aboard the train. The passenger will be waiting behind the riser as the train arrives. *This will also act as a safety barrier and avert any accidents or prevent passengers from falling off the platform onto the tracks.* As the train stops beside the platform, the passenger can get on the riser and get on the train or get down from the train on to the riser easily.

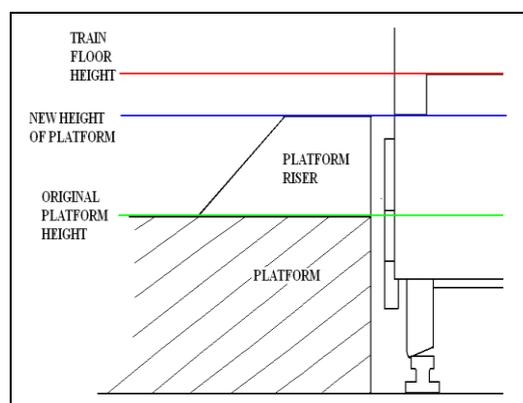


Fig 4: The platform riser concept

### Platform Gap Fillers

Platform Gap Filler is mounted along the edge of a train platform to reduce the gap between the platform and the entrance of a passenger train; ensuring that when a train has stopped at a platform, passengers are able to enter and exit with safety. [2]

Platform gap fillers are usually made of rubber or metals. But certain grades of polymer and plastics can also be used to manufacture the gap fillers and hence reduce the plastic footprint on Earth. A rubber strip can also be attached over the gap fillers for added safety and grip. These strips can be made from spare or discarded rubber items by rubber manufacturing processes. Platform gap fillers need to be strategically placed in the gap between the platform and train.

Recent studies have shown that the use of platform gap filler not only improves passenger safety, but can also increase efficiency of entry and exit times. These devices can also decrease the standing time of trains in stations. Gap fillers can also aid the disabled and make the access of wheelchairs in the future. India has still not made any equipment adjustment to assist the disabled and people with wheelchairs. But it is expected that this condition will improve in the future.



Fig 5: MTR Lo Wu Station Platform Gap Fillers (Hong Kong) which extend slightly over the platform edge and reduce the gap

Platform gaps can be used on any platform which has a gap between the train and the platform. Careful observations must be made before hand to see that the gap fillers do not interfere with *any* train passing through that platform. This data can vary from one station to another, so the dimensions of the platform gap fillers must be made with caution.

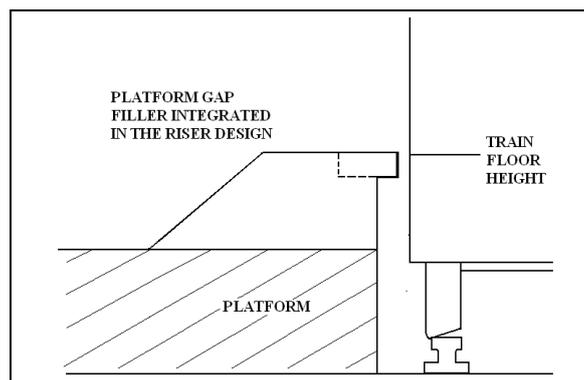


Fig 6: Concept of platform gap fillers integrated with platform risers

The trains and platform must be at the same height for the platform gap fillers to work. If this is not the case, the gap fillers can be installed over the platform risers or integrated into their design.

### Uses

The platform risers and platform gap fillers or a design combination of both has multiple uses to provide relief, comfort and ensure the safety of the passengers. It is an excellent preventive measure for accidents and is a cost effective solution too.

**Use of plastic platform risers**

1. Can be used where the platform floor is much lower than train floor height.
2. The platform risers can act as a barrier for reckless passengers moving close to the platform edges, because now the passengers will be forced to walk beside the risers.
3. The risers will be a great advantage for passengers in wheelchairs and the disabled to get onboard trains. Now only one person can assist them and there is no need to use special trolleys or movable equipments (refer fig. 2)
4. It will be extremely useful to carry heavy luggage or rail goods in and out of the trains or the vendor coaches.
5. Decreases dwell time of trains in stations, thus improving rail traffic.
6. Thin rubber mats can be attached to the hard polymer risers for added grip and safety.
7. Broken and chipped off edges of the platform need not be repaired if risers are installed for use.

**Use of plastic platform gap fillers**

1. Used where the platform and the train floor height are nearly the same.
2. Used to prevent accidents by guarding passengers, things, etc. to fall inside the gap between the train and the platform.
3. Aid the disabled and passengers in wheelchairs to use the trains
4. Acts as a cushion in case the train derails and crashes into the platform.
5. Rubber mats attached with the gap fillers can provide added safety grip.
6. Also decreases dwell time of trains in stations.
7. The gap fillers can be strategically placed to cover only the region where the train doors are located. This saves some cost.

**CONCLUSION**

There are many benefits of having platform risers and gap fillers, especially those made of plastic or polymers. In India, there has been a standing problem of platform to train floor height mismatch and gap problem, which has been neglected till date, due to lack of feasible ideas and cost effective means. There have been numerous accidents in India, where a person has been seriously injured or lost their lives due to the lack of such safety features [3]. Although the condition of Indian railways is improving in terms of infrastructure and cleanliness, it lags by a big margin in terms of safety with the other countries. Steps must be taken to make Indian railway at par with the world, both in terms of service and safety.

Safety of passengers is paramount and the added cost of manufacturing and installing the platform risers and gap fillers in the platforms is justified. Also, there is no need for standardizing the platform, the train floor height or the track height, all over India. The railways have seen numerous accidents and mishaps as well as passenger distress in the past [4]. Future railway accidents can be decreased with these small added devices and preventive measures thus saving a lot of lives.

Lastly, this is a big step in plastic waste management. Plastic waste management is a very important concern all over the world. The only way it can be managed is if we make alternate useful products, out of the plastic waste generated, in the long run. If any industry comes forward to manufacture and sell platform safety devices; it would reduce the polymer and non-biodegradable products by a substantial extent and can prove advantageous in the long run.

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