

# PREVENTING LEVEL CROSSING ACCIDENTS

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## SUMMARY

This technical paper is to bring awareness of the safety improvements that are available for rural or isolated crossings where power is not available or the supply of power is intermittent.

In the following paper we will demonstrate the ability to reduce the amount of crossings if a manual gate or barrier is in place by **80%**. If power supply is an issue then this paper will also cover what can be done to continually automate a system to provide the safest possible crossing.

The solar "POGO" (Power Operated Gate Opening) system has been developed by two companies in the UK where four hundred systems are currently being installed.

## INTRODUCTION

Although level crossing incidents are relatively low compared to the South African road death toll, these incidents gain large media attention usually due to the severity of the accidents. Level crossing dangers and accidents are not unique to South Africa, and international Police statistics show that 95% of these incidents are due to driver error.



Drivers and pedestrians often miscalculate the approaching train's distance and speed which result in near misses, or actual incidents. South Africa has 7500 level crossings, and in 2008 there were 129 incidents on Transnet controlled crossings with 13 fatalities.

It is the aim of the service provider to provide a solution to reduce the amount of near misses, incidents, accidents and fatalities on Railways throughout the world.

## NOTATION

**POGO** Power Operated Gate Opener

**ORR** Office of Rail and Road is an independent regulator, ORR operates within the framework set by UK and EU legislation and is accountable through Parliament and the courts of England and Wales.

**UWC** User Worked Crossings (UWCs) for vehicles – this type of crossing is normally protected by gates, or lifting barriers on both sides of the railway. The gates, normally closed across the road and hung so as to open away from the railway, are operated by the users.

**R&D** Research and Development

\*Information and image from <https://www.arrivealive.co.za/Road-Safety-and-Rail-Crossings-Level-Crossings>

## **OVERVIEW**

Inherently trains and rail tracks are very safe particularly in the United Kingdom compared with other European and Worldwide train systems. The majority of issues arise when a track crosses an intersection be it across another rail track, roadway or path and where the train and other vehicles or people/ animals have the possibility of coming into contact with one another.

### **Some interesting facts**

- More than 80 percent of incidents were during daylight, in fine weather and on a straight road; (In South Africa the highest accident rate is at 19:00 and there is normally a correlation between road accidents and level crossing accidents)
- Two-thirds were in country areas; (South African hot spots is in the Rustenburg and Witbank area.)
- Forty-four per cent happened at crossings without an electronic warning system such as flashing lights and/or boom gates; (South Africa has very few fitted with flashing warning lights and less with booms.)
- More than half occurred where there was a warning system - including 10 per cent where there were boom gates;
- Two-thirds of the drivers, motor cyclists were hit by the front of the train, not running into the side of it;
- Heavy trucks were involved in about 15 per cent of fatal rail crossing crashes. \*

### **No Power, No problem.**

In South Africa we have the added challenge of load shedding that can render the electronic crossings in-operational for certain lengths of time. Another challenge is our vast country does not easily lend itself to installing power to crossings in the rural areas cost effectively. Although Transnet embarks on educational campaigns to try and prevent incidents, there are other solutions.

In the UK, a solar gate system (POGO) has been successfully introduced to reduce the number of incidents. The company that has pioneered this solar system is Gatecare Ltd who have also received two awards for the system after being nominated and shortlisted for four awards by the Rail Industry at their annual Rail Industry awards ceremony.

The awards were for "R&D" and the "Cost based reduction" categories; the latter award was for the project's ability to reduce costs against other alternatives. In addition they are finalist in the TMMX awards a national awards ceremony for excellence in manufacturing that covers all manufacturing in the UK.

Network Rail is in the process of installing 400 of these systems and has granted "product acceptance" which ensures that the system has been stringently tested and approved for Rail use by Network Rail (Product Acceptance number: PA05/05508) and the focus is around "User Worked Crossings" in the more rural areas, however the system is not just limited to these areas.

## **Reducing the amount of crossings by 80%**

The system cuts the number of crossings by the user by 80% when measured against manually operated gates, and allows the “user” to focus on crossing the track itself as the user only needs to cross once.

The train is further away than it would be on a manual crossing as the user would have to cross five times opening and closing the gate each time! Any approaching train is a lot closer by then and the user is at a less heightened state of alertness having successfully crossed the track four times.

## **How many times do people cross the track?**

Interesting statistics if only 1000 of the crossings that have manually operated gates and were used only 10 times a day every day the actual number of crossings would be 18,250,000 (1000x10x5 crossings each time x 365 days a year) .

When a POGO system is installed the numbers come down to **3,650,000** crossings, which is a reduction of potential incidents opportunities of **14,600,000 on the same 1000 crossings**, the safety aspects speak for themselves.

In addition the system also helps prevent livestock wandering across the track with an oncoming train approaching preventing possible derailment.

## **Remote areas where power is not available or the supply of power is intermittent:**

In South Africa we have the added challenge of load shedding that can render the electronic crossings in-operational for certain lengths of time. Another challenge is our vast country does not easily lend itself to installing power to crossings in the rural areas cost effectively. Although Transnet embarks on educational campaigns to try and prevent incidents, there are other solutions.

The main problem is powering remote locations. With the use of renewable energy and the specifically designed POGO system designed for Network Rail means this is a thing of the past.

The United Kingdom is not known for its sunny climate however the POGO system has been optimised for the prevailing climate along with the fully approved Product Acceptance number which ensures that the system has been fully tested track side so as to ensure that the POGO system or the trains system will not interfere with one another.

The fully self contained power plant has been designed to meet the needs of the POGO system which in itself requires minimal power to operate even on larger gates.

Power outages or load shedding do not affect the system as the system is off grid so will operate independently.

The links below indicate the issues experienced in South Africa with load shedding:

<http://www.fin24.com/Economy/Eskom/Expect-a-tight-electricity-system-says-Eskom-20150913>  
<http://www.fin24.com/Economy/Eskom/Eskom-implements-stage-1-load-shedding-20150914>  
<http://www.fin24.com/Economy/Eskom/Six-ways-SA-is-tackling-its-electricity-crisis-20150908>  
<http://www.fin24.com/Economy/Eskom/Lynne-Brown-Eskom-not-out-of-the-woods-yet-20150904>  
<http://www.financialmail.co.za/features/2015/02/05/economy-too-dark-to-shop>  
<http://www.miningreview.com/eskom-load-shedding-is-dooming-south-africas-economy-says-economist/>  
[http://www.iol.co.za/motoring/industry-news/load-shedding-linked-to-road-crashes-1.1848578#.Vfe4CH1v\\_4Q](http://www.iol.co.za/motoring/industry-news/load-shedding-linked-to-road-crashes-1.1848578#.Vfe4CH1v_4Q)  
<http://www.saflii.org/za/cases/ZAWCHC/2013/151.html>  
<http://www.transnet.net/PressOffice/Press%20Office%20Release/Transnet%20takes%20giant%20leap%20in%20railway%20level%20crossing%20safety.pdf>

The solar system works and needs just day light (otherwise it wouldn't work in the UK!), and allows the gate to open 120 times per day on the battery power. With the amount of sunshine Africa enjoys, it makes perfect sense to seriously consider Solar as the way forward, with no interruptions due to load shedding, and no costly infrastructure required only the civil engineering work to install the system. It is almost as though the system was meant for Africa.

### **Solutions to reduce incident opportunities:**

There are solutions to limits these:

- Remove possible interaction points
- Reduce speed at interaction points
- Reduce the amount of times a track is crossed
- Limiting free access by gates or barriers if none are in place

This is by no means an exhaustive list however it is a list that would reduce the amount of incidents, near misses, accidents and fatalities dramatically.

Unfortunately there are a number of accidents and fatalities that occur due to the wilful neglect of virtually any safety system these are predominately suicides or people not realising the dangers through drink, drugs or education. Most of these with the acceptance of education have far reaching social issues and are not included in this white paper.

Educating the users of the dangers of crossings when traversing a track is ongoing as every generation has to be educated of the dangers a crossing poses.

Removing the crossings or possible contact points is one way although it can be prohibitively costly and in a lot of cases impossible due to the need to reach a destination for those that are not using the rail as a means of transport.

Reducing the amount of times a track is traversed will bring the possible collision count down along with signage and warnings.

For manually operated gates or barriers the track has to be traversed five times if crossing in a vehicle. If the system is automated then this reduces to just once.

Virtually all of the “user worked crossings” in the United Kingdom have up until now been manually operated gates. The statistics show that a high level of incidents happen at user worked crossings.

### **Are there many collisions on UWC's?**

The user worked crossings account for over 50% of all vehicle incidents on ALL crossings with trains page 32 of the report that can be accessed by the link below:

<http://www.rssb.co.uk/Library/risk-analysis-and-safety-reporting/2010-report-road-rail-interface.pdf>

Network Rail are committed to automate user worked crossing as per the internet link <http://www.networkrail.co.uk/transparency/level-crossings/?cd=2>

### **Summary**

The potential incident opportunities from unprotected or manual crossings can be reduced even if the location of the crossing is remote.

Our aim is to highlight the effective solutions to keep all railways as safe as is possible. We understand that there is always a limited budget however safety is first. With POGO solutions you have system that not only works, but is built so that virtually any remote crossing can be installed.

Network Rail's vision for safety “is to get everyone who comes into contact with the railway, home safe, every day”.