



The animal protection device UOZ-1

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Animal Protection Devices UOZ – an answer to the global problem of animal-train collisions

The probability of collisions with animals and their consequences depend on several factors, of which the speed and design of the train are very important. The problem of safety related to collisions concerns much more passenger trains than freight trains. Data obtained from carriers unambiguously indicate the growing scale of the problem – the number of incidents increases every year, as well as the related costs of rolling stock repairs, delays in train traffic, passenger confidence loss or costs of lowering the level of railway traffic safety. Collision maps made on the basis of these data should be a prelude to designing a system of preventive measures implemented in places with the highest risk. We should not wait with the introduction of preventive measures to a railway disaster. To protect sections of railway lines with an increased risk of collisions with animals the best available solution is the system of UOZ animal protection devices. This system, protecting both trains and animals from the effects of collisions, is still the most innovative and modern solution on a global scale. The growing interest of foreign railway authorities and our readiness to offer a state-of-the-art, proven system gives the opportunity to introduce the Polish invention to railway lines all around the world.

Train collisions with wild animals are a multidimensional issue, connecting involving environmental issues, economic as well as train traffic safety. The development of technology – an increase in speed and in train traffic volume, and construction changes in vehicles – all of this increases the risk and costs associated with collisions.

This applies to the countries all over the world. In Europe, wild boars are common and can travel along the tracks in numerous packs. In Scandinavia there are many moose, which pose a great threat due to their size, and in the far north there are reindeer creating huge herds. In some African and Middle East countries the problem mainly concerns camels. In Asian countries the most serious problem are elephants.

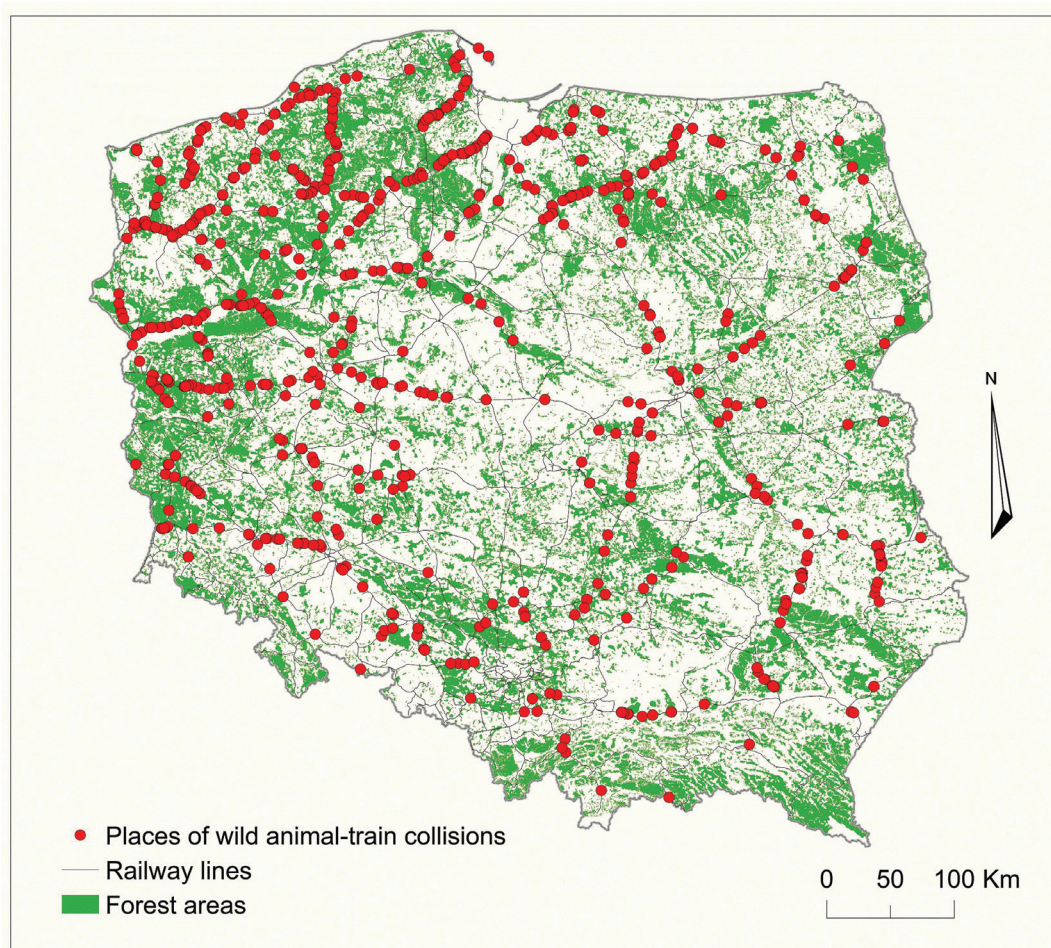
On the other hand, awareness of this risk is growing, as well as pressure from natural conservationists. The use of anti-collision measures is being more and more often considered when planning modernization of railway lines. One of the solutions to the problem is an animal protection device developed in Poland, whose effectiveness has been confirmed by scientific research.

Collisions with animals and train traffic safety

The effects of collisions with animals depend primarily on the speed of the train, the size of the animal and the design of the vehicle. The higher the speed and the greater the mass of the animal, the higher the collision energy and the greater the risk of rolling stock damage. At the same time, the lighter and more delicate the vehicle is, the greater the chance of more serious damage. Also, the lighter and faster the vehicle, the greater the risk of derailment when running over a large animal.

Below are examples illustrating the reality of this threat:

- ♦ On 26 April 2008, in Germany, an ICE train hit a flock of sheep at the entrance to a 10-km-long tunnel. Despite the emergency braking the train only stopped after running three more kilometres. Before the end of breaking four car-



Map of „black spots” on Polish railway lines

riages derailed. The derailed carriages did not roll over and only thanks to that just 20 people out of 170 suffered injuries. The route's viability was restored after a few days.

- ◆ The most serious accident involving one animal occurred in 1984 in Scotland: “The Polmont rail accident, occurred on 30 July 1984 to the west of Polmont, when a westbound push-pull express train travelling from Edinburgh to Glasgow struck a cow which had gained access to the track through a damaged fence. Consequently, the collision caused all six carriages and the locomotive of the train to derailed, killing 13 people and injuring 61 others.” [source: en.wikipedia.org]
- These examples show the most serious possible effect of train collisions with animals – a real threat to the train safety.

Data on collisions in Poland

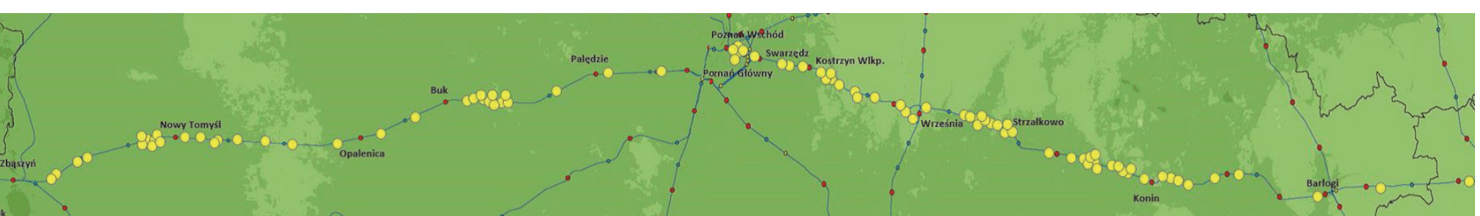
Data on collisions with animals are collected by the Polish Railway Lines. On the basis of these data from recent years a map

of „black spots” on railway lines was created, i.e. places where collisions occur most frequently. There are sections visible with particularly high collision density, especially in north-western part of Poland.

Also individual carriers keep their own records of events with the participation of animals. For example, a graph illustrating collisions on two sections of railway lines operated by Koleje Wielkopolskie.

If you compare both sets of data, you will see that the information collected by the carrier is more detailed and contain many more events. When extrapolating this data, we come to the conclusion that the number of events on a national scale may amount to several thousand a year. And each of these events is potentially a risk of a serious accident.

Although the majority of events do not result in any damage or there are only minor scratches, one must be aware that hitting an animal can lead to such damage which can affect the



Collisions of animals with trains of the Wielkopolska Railways on the E20 line



Map of the UOZ-1 devices in Poland (end of year 2017)

traffic safety. When the body of an animal gets under the train, it can cause ripping off the chassis components, which prevents further safe driving. In this way even a small animal can cause damage seriously jeopardizing the traffic safety.

We do not have accurate statistics on the number of collisions with animals in Europe and the world. Foreign press reports mostly refer to individual cases, but they do give some insight into the scale of problems faced by foreign railway managers. For example, Indian railways mainly face a problem of elephants.

Application of Animal Protection Devices

Fifteen years ago, in 2003-2004, we developed an animal protection device for railway lines called UOZ-1. This system prevents animals from entering the railway tracks immediately before the passage of a train, through the emission of sounds warning animals about the oncoming danger. A sequence of natural sounds based on innate reactions of the self-preservation instincts deters animals from the tracks, and what is more animals do not become accustomed over time to the used signals. UOZ devices are designed for assembly in places where wild animals tend to cross the tracks. It is still the only solution in the world with scientifically proven, very high effectiveness, that does not require fencing the line.

The UOZ devices are a solution much cheaper than construction of special passages for large animals, and they enable protection of any length of the railway line. Its great advantage is the lack of a barrier effect.

These devices were first installed on the section of the E20 line modernized in the years 2003-2004. Then next installations

followed. To date, nearly 1,000 such devices have been installed on Polish railway lines.

Almost from the beginning of the devices' existence, they aroused interest from abroad. In 2012, the UOZ-1 system was installed on the Russian Railways. At present, there are ongoing tests of the UOZ system carried out by railway managers in Japan and Israel. Railway managers from further counties are preparing for testing.

Recently, we have undertaken a comprehensive modernization of the UOZ system, called UOZ-2. The aim is to create a system operating autonomously, without the need to link with railway traffic control systems, which is technically universal, adapted to both electrified and non-electrified railway lines, making maximum use of renewable energy sources.

The development of the UOZ-2 system will enable us to offer users worldwide the most modern, effective, easy to install and easy-to-use system significantly reducing the risk of collisions of trains with wild animals and improving the safety of train traffic.



Marek Stolarski

Marek Stolarski – President of the Board and General Director NEEL sp. z o.o.

He was born in 1947 in Ostrow Wielkopolski, Poland. In 1970 he graduated Warsaw University of Technology, with a degree in the specialty of railway traffic control.

He worked in automatics and telecommunication in PKP (1970–1972) and in Railway Scientific and Technical Centre (The Railway Research Institute) in Warsaw, working on remote railway control and remote traction power supply. laureate of many awards in category of railway technical solutions.

Coordinator of many international research programs RWPG on remote railway traffic control.

Since 1993, President of the Board and General Director NEEL sp. z o.o. in Warsaw. Specialist of the automatic and influence of railway on environment.



Dorota Bartoszek-Majewska

Dorota Bartoszek-Majewska graduated from the Academy of Economics and the Warsaw School of Economics with an MBA. She deals with the impact of rail transport on natural environment.

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Joanna Żyłkowska

Joanna Żyłkowska is a graduate in Environmental Protection Studies at the Warsaw University. Professionally, she deals with the problem of animal collisions with trains.