

Animal safety on railway lines

A device that reduces animal/train collisions...

Based in Warsaw, NEEL Ltd. was established in 1993 by a group of former employees of the Polish Railways Scientific and Technological Centre. Today our main clients include the PKP Polish Railway Lines Company, Bombardier Inc., SKANSKA S.A.

The main scope of the company's operation is the development and production of microprocessor automated systems that supply electric currents to railways for traction – 3kV DC (PKP) and the 600V DC (for trams). These devices constitute part of the state-of-the-art stations' traction equipment, constructed on the basis of the so-called 'distributed intelligence' utilising the CAN-BUS type of computer bus. Such devices have been installed in 11 modern PKP traction substations and many tram substations.

Over 140 PKP cabin sections and over 100 PKP traction substations have been equipped with a system developed by NEEL – the EUU electronic dependencies system, which has replaced the old and faulty exchange devices used by PKP so far.

In 1997 to 2004, NEEL developed and installed the heating and air-conditioning testing system for passenger carriages stationed at three PKP rail terminals. The system enables: testing of the heating and air-conditioning systems, current measurements, defect localisation, as well as the preliminary warming-up of carriages waiting for connection to a locomotive.

The NEEL production offer also contains so-called 'transformer boxes' (type ZTS-1, 5W or 7.6kVA), which supply current for the electrical heating of junction turnouts/points.

The UOZ-1

Our latest invention is an absolute novelty on a worldwide scale – an acoustic animal deterring device, the 'UOZ-1', which is designed for high-speed railway lines. Making use of many years of experience in the construction of microprocessor devices for the PKP and numerous consultations and cooperation with ecologists, scientists and experts in the field of wild animal behaviour, NEEL Ltd., along with other specialists, has developed a device that helps to protect wild animals living in the vicinity of train lines.

‘The device operates through sound signals, which deter animals from going near to the tracks.’

The UOZ-1 device is intended for installation along railway lines, with the purpose of preventing the migration of game animals, such as deer, elk, boar and fox, across railway tracks (where trains travel at speeds of 160km/h), in order to minimise losses to the populations of such animals caused by collisions with rapidly approaching trains, while the same time, not imposing limitations on the free movement of animals in their feeding and breeding areas.

The device operates through sound signals, which deter animals from going near to the tracks. Signals can be emitted by the UOZ-1 device for a set time (30 seconds to three minutes) directly before a train approaches the site. Animals perceive the sound as a warning and react as they would if they came across a natural predator or another danger that they are

genetically programmed to avoid. The sounds used to compose the deterring sequence form the so-called 'key stimuli proxy', which consists of the highest priority stimuli known to arouse fear in animals.

The operation of UOZ-1 device does not violate the provisions of the Nature Protection Act pertaining to the prohibition against startling and scaring wild animals. Only sounds that actually occur in nature are used to construct the sound sequences, and they are emitted at a natural volume. The purpose of the device is to limit the mortality of animals. The presence of protected species' habitats is not a counter indication to the use of UOZ-1 devices.

The UOZ-1 system has important advantages over the other common solutions widely used in Western European countries on tracks of high velocity railways: high wire fences combined with sub- and on-ground constructions like tunnels or overpasses. In comparison, when using UOZ-1 devices animals are virtually free to cross tracks that lie within their feeding and mating grounds. Secondly, the investment cost is significantly lower.

The application scope of UOZ-1 devices consists of protecting railway routes at locations that animals regularly migrate – in such instances, this could be specific protection covering an area approximately 400m, or continuous protection over several kilometres or more, eg. along the boundaries of a nature reserve or within large forest complexes, depending on the size of the protected zone.



The use of UOZ-1 devices depends on train speeds and the planned traffic density, ie. the time between trains. At low speeds – up to 50km/h – acoustic devices aren't necessary as animals have a high probability of effectively fleeing from the tracks. At higher speeds – between 50 to 200km/h – UOZ-1 devices should be utilised to protect animals against collisions, as confirmed by the results of tests conducted on the E 20 rail line. At higher speeds – above 200km/h – it is necessary to fence off the railway lines and build a system of passageways for animals.

Another intrinsic barrier to the utilisation of the UOZ-1 device is dense rail traffic at regular intervals of

between five minutes or less (lines within large municipal areas). For a two track railway line, this means that the barrier effect becomes very significant as animals will have major difficulties safely crossing the tracks. In practice, for primary railway lines this phenomenon does not occur, and even if there are periods of high traffic density, there will also be periods of shorter interruptions, eg. at night, when animals may be present in the area of the tracks and can cross them without any limitations.

The first devices were installed in 2003-2004 on the E-20 railway line between Minsk Mazowiecki and Siedlce on the Warsaw-Terespol route. Currently, they are being installed along the E-59 line

between Warsaw and Gdańsk, and in the near future, they will be installed along most of the main rail lines in Poland.

“The UOZ-1 devices significantly reduce the risk of animal/train collisions.”

Introductory research conducted by the Forestry Research Institute in Warsaw in 2004-2005 and subsequent two year monitoring conducted by Warsaw University of Life Sciences in 2008-2009, has proven the effectiveness of the UOZ-1 system. The following conclusions can be drawn from the research:

- Within the area of an UOZ-1 device animals eagerly utilise the vicinity of the tracks as feeding and traffic areas;
- As a response to deterring sequence the majority of animals leave the site; only under exceptional circumstances (when chased by dogs) did they cross the rail tracks;
- After the passage of a train, the animals continue uninterrupted activities: feeding or crossing the rail line;
- Animals did not get used to the UOZ-1 signals;
- Most animal collisions with trains occurred outside the protected areas (only two collisions occurred in the direct area of UOZ-1 operation: a deer and a doe, both chased by dogs, were killed by a train);
- The UOZ-1 devices significantly reduce the risk of animal/train collisions.

The UOZ-1 device is an excellent solution in lowland areas that lack topographical features. It should be treated as one of several technical measures that are highly valuable in protecting nature. This method allows for the continuity of ecological corridors and animal migration routes to be maintained, whilst minimising collisions with trains.



Marek Stolarski
Chief Executive Officer

NEEL Ltd
ul. Białozora 3
02-817 Warszawa
Poland

Tel: +48 22 649 56 30
Fax: +48 22 648 41 30

neel@neel.com.pl
www.neel.com.pl