According to new Swiss study, Ecole polytechnique fédérale de Lausanne (EPFL – Swiss Federal Institute of Technology in Lausanne) recently released a study on ballast projection. The results have enabled the Swiss railway operator SBB to take measures to improve track-side safety. SBB carries almost one million passengers a day in all weather, including particularly difficult winter conditions. With the aim of improving safety, in 2012 SBB mandated the EPFL Transport Centre to study the ballast projection phenomenon during cold spells.

The study allowed researchers to determine which areas were the most affected: typically the western and central parts of Switzerland registered the highest number of incidents. Researchers noted that in each case the maximum authorised speed on the stretch was between 140 – 160 km/hour, there was heavy snowfall along the stretch and often the train ran alongside a lake or river. One possible explanation is that snow-laden trains descending the Bern-Fribourg route warmed up in Lausanne, resulting in ballast spray along the Geneva-Lausanne stretch. It is also worth noting that many cases of flying ballast occur inside tunnels, particularly on the Olten-Basel stretch. There too, the warming of snow and ice blocks as the train passes through the tunnel could be the cause.

EPFL researchers have tried to identify all possible causes, looking, for example at wagons themselves. They also investigated at track level to determine if wheel passage across glued joints (between two rail sections), as well as on switches, could cause ice to fall and thus induce the flying ballast phenomenon. According to researchers, there are many possibilities to help better understand the evolution of the phenomenon. One of the measures taken by SBB is to impose speed restrictions on trains in heavy snow conditions.

EPFL researchers have also recommended addressing various weaknesses: replace glued joints by continuous welded rails in heavily populated areas, use recent ICN type trains on sensitive stretches and consider erecting noise barriers, which would also serve to stop potential flying ballast. With the aim of improving railway safety, in December 2012 SBB imposed local weather-dependent speed limits for a few hours. This caused delay to passengers, but it guaranteed maximum safety. The railway company also conducted additional wintertime inspections on rolling stock, lowered the ballast level to reduce the effects of falling ice blocks and treated the undercarriages with a lacquer to prevent ice from accumulating. As the winter of 2013 – 2014 has been rather mild, speed restrictions have not been necessary along the network.
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