8. ZAKLJUČEK

Pri vključenem protihrupnem sistemu se ob vstopu v zavoro venci koles ustrezno podmažejo, kar povzroči spremembe v silah trenja med zaviranjem. Pri tem je bilo zagotovljeno tudi varno ustavljanje železniških kompozicij. Sicer je takšna rešitev samo iz akustičnega stališča med najboljšimi, saj zagotavlja občutno zmanjšanje ravni hrupa tudi nad 30 dBA in to s posegi na samem hrupnem viru.

Takšen sistem nanosa protihrupneg medija pa je smiselno uporabljati tudi na zakrivljenih delih proge, kjer prihaja do cviljenja že brez uporabe zavor. Vzrok za to je drsenje zunanjega kolesa po vrhu tirnice. Nekatera prejšnja opazovanja so pokazala, da je to drugi najpomembnejši vir hrupa na ranžirni postaji.

Iz množice analiziranih spektrov sledi, da je brez uporabe protihrupnega sistema, oziroma dokler še ni vzpostavljen nanos medija po celotnih zavornih tirnicah, zvočna energija skoncentrirana v frekvenčnem območju med 2 in 4 kHz, ki močno izstopajo iz spektra in so zdravju še posebej nevarne. Po polnem učinkovanju protihrupnega sistema se spekter izgladi, tako da se poleg celotne ravni hrupa močno znižajo tudi problematične visokofrekvenčne komponente.

Obravnavana protihrupna sanacija z montažo protihrupnih sistemov se je že v preizkusni fazi pokazala kot zelo dobra. Razlika v ravneh hrupa pred in po vključitvi protihrupnega sistema se gibljejo od 6 dBA navzgor. Nadalje je bilo opazno, da protihrupni sistem za svoje optimalno obratovanje potrebuje določen čas. Protihrupno sredstvo se vbrizgava diskretno na posamezne točke zavornega tira, zato je potrebno določeno število voženj, da se enakomerno raznosi po celotni dolžini zavornih tirnic. Zato so se rezultati preizkusov s časom izboljševali, znižanje hrupa cviljenja zavor pa je bilo v takšnih razmerah okrog 30 dBA, kar predstavlja znižanje moči hrupa za približno 99,9%. Rezultati meritev so razvidni iz tabel 1in 2, spektralne analize pa se nahajajo v prilogi.

Iz opravljenih meritev in analiz sledi, da je bilo z uporabo obravnavanega protihrupnega sistema doseženo visoko znižanje ravni hrupa pri zaviranju in je smiselno nadaljevati z njegovim razvojem in montažo na ostalih tirih.

ZAVOD ZA VARSTVO PRI DELU d.d. ZVD LJUBLJANA

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8. CONCLUSION

When the anti-noise system is switched on, on the braking surfaces will be precisely inject the defined quantity of the special medium when entering the brake, what causes changes in the frictional forces during braking. Herewith safe stopping of the railway compositions has been assured, too. As for the acoustic point, such solution is among the best possible as it enables a considerable decrease of the noise level even above 30 dBA and that with interventions at the very source of the noise.

It is reasonable to use such system of lubrication on curved parts of the track, too, where, even without using the brakes, squealing appears. Cause for this is gliding of the external wheel on the top of the track. Some previous observations have indicated that this is the second most important source of noise at shunting stations.

From a multitude of analysed spectrums follows, that without using the anti-noise system and before lubrication along the whole braking surfaces has been established, respectively, the sonic energy is concentrated in the frequency range between 2 and 4 kHz, which are strongly projecting from the spectrum and are particularly dangerous for health. After the full effect of the anti-noise system is in force, the spectrum smoothes, so that beside the whole over all of noise problematic high-frequency components are strongly decreased, too.

The treated anti-noise improvement by mounting anti-noise systems has proved to be very good already during the testing phase. The difference in the levels of noise before and after switching in the anti-noise system is ranging from 6 dBA upwards. It could further be noticed that the anti-noise system needs a certain time for its optimal operation. The lubricating medium is injected discretely to single points of the braking surface, therefore a certain number of runs is necessary to spread evenly along the whole length of the braking surface. Therefore the test results have been improving during a certain time, the decrease of noise caused by squealing of the brakes has under such conditions reached 30 dBA, which represents a decrease of the noise power for app. 99,9%. The results of measurements are evident from Tables 1 and 2, spectral analyses can be found enclosed.

From the performed measurements and analyses follows, that by using the treated anti-noise system, a high decrease of the noise level at braking has been achieved and that it is reasonable to continue with its development and mounting on the rest of tracks.

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his own signature