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TII RESEARCH

RESEARCH PROJECT TITLE: ASSESSMENT OF THE EFFECTIVENESS OF NOISE REDUCTION SYSTEMS ON DUBLIN'S LIGHT RAIL SYSTEM (LUAS)

START DATE: **March 2011**	END DATE: **January 2012**

CONTRACTOR: Tata Corus/Crumb Rubber

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DESCRIPTION: Light rail systems are a sustainable and climate friendly means of transport. Rail transport can, however, result in environmental pollution; noise being the most commonly cited. The most significant source of noise on a light railway system is rolling noise, caused by the action of steel wheels rolling on steel rails. Rail track type can also affect noise emissions. One particular track type, "slab track", is formed by fixing rails directly to a reinforced concrete slab and is generally installed on sections where ballast is not appropriate. However, slab track has a reputation for being rather noisy. Increases in noise level, relative to ballasted track, of between 2–4dB are typically found. This research project assessed the effectiveness of noise mitigation measures for slab track during the operational phase of Luas.

OBJECTIVES:

- To critically review light rail noise reduction methods
- Installation of two noise reduction systems:
  - Bespoke absorbing rubber mats which aim to reduce noise generated by converting sound energy to heat energy, i.e. a porous absorber
  - Rail dampers which aim to reduce the length of rail which radiates noise by increasing damping
- Critically review the implemented noise reduction methods and determine through analysis of collected noise data (pre- and post-installation of noise reduction methods) at sensitive receptors, any reductions achieved in noise levels

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BENEFITS: The research will be used to inform mitigation measures to be selected for future Luas lines. This is of considerable benefit to TII as it will help to ensure ongoing compliance with Environmental Impact Statement (EIS) predictions. The noise reduction test systems trialled are suitable for use in tandem or in conjunction with other rail mitigation measures, e.g. rail grinding and/or tram mitigation measures such as bogie shrouds. Further research could be undertaken to identify if there is an ideal coupling of the technologies for Luas.

RESEARCH FINDINGS:

- The equivalent continuous sound pressure level (L_{Aeq}), sound exposure levels (L_{AE}) and maximum sound pressure levels (L_{AFMax}) recorded for the section of track installed with rail dampers decreased by approximately 2–3.5dB, post installation
- A comparison of the acoustic frequency spectrum for the section of track installed with rail dampers identified that reductions were obtained at frequencies between 125Hz and 2,500Hz
- The L_{Aeq}, L_{AE} and L_{AFMax} recorded for the section of track installed with absorbing rubber mats decreased by approximately 2.5–4.0dB, post installation
- A comparison of the acoustic frequency spectrum for the section of track installed with absorbing rubber mats identified that reductions were obtained at frequencies between 250Hz and 2,500Hz
- The rail dampers tested for this study were not tuned. By tuning the rail dampers to Luas specific acoustic frequencies, greater reductions may be achieved
- A difference of 3dBA between the levels of two sounds separated by a time interval is generally considered to be the minimum perceptible difference. The results from these two systems may therefore be considered to be just perceptible to the human ear. This suggests that the noise reduction test systems would be more suitable for use in tandem or in conjunction with other mitigations

CONTACT DETAILS

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