

ΕΠΙΛΕΓΜΕΝΑ ΕΡΕΥΝΗΤΙΚΑ ΠΡΟΓΡΑΜΜΑΤΑ

Ερευνητικό Πρόγραμμα: Ευρωπαϊκό Πρόγραμμα Quiet Tracks for Sustainable Railway Infrastructures (Quiet Track) του Seventh Framework Programme» Ε.Ε. 4814, Πανεπιστήμιο Θεσσαλίας - Τμήμα Πολιτικών Μηχανικών, ΣΣΕ & Περιβάλλον Α.Ε., 2014.

Το αντικείμενο των εργασιών του εργαστηρίου Περιβαλλοντικής Ακουστικής Συγκοινωνιακών Έργων του Τμήματος Πολιτικών Μηχανικών του Πανεπιστημίου Θεσσαλίας περιλαμβάνει Συντονισμός, οργάνωση, επίβλεψη και αξιολόγηση των ακουστικών μετρήσεων ακουστικών εφαρμογών μείωσης του αερόφερτου θορύβου συρμών στο δίκτυο της Γραμμής 1 ΗΣΑΠ (ΣΤΑΣΥ Α.Ε) στα πλαίσια του ευρωπαϊκού Προγράμματος Quiet Track.



Το Ευρωπαϊκό Πρόγραμμα QUIET TRACK (Project No 604891: Quiet Tracks for Sustainable Railway Infrastructures), και ιδιαίτερα το working package, (WP4), διερεύνησε την ανάπτυξη και τον επιτυχή συνδυασμός πρωτότυπων αντιθορυβικών λύσεων σε επίπεδο τροχιάς και έδρασής της.

Στην Ελλάδα ως πρωτότυπο «test site» επιλέχθηκε από το πρόγραμμα, η γραμμή Μετρό 1 (πρώην ΗΣΑΠ) της Αθήνας όπου έχει εγκατασταθεί το σύστημα RHEDA.

QUIET-TRACK

Development and validation of high performance solutions for reduction of track related noise (WPA)

The overall objective of the QUIET-TRACK project is to provide step-changing track based noise mitigation systems and maintenance schemes for the railway rolling noise. Work package 4, task 4.1 in particular, focuses on the combination of existing track based solutions to yield a global performance of at least 5 dB(A). The validation was carried out considering a track section in the network of Athens Metro line 1, with an existing outside concrete slab track (RHEDA track) where high airborne rolling noise was observed.

The procedure for the selection of mitigation measures is based on numerical simulations, combining base software tools for noise prediction (SBR201) and BBN with experimental determination of the equivalent track and vehicle parameters (e.g. rail and wheel roughness). The availability of a detailed rolling noise calculation procedure, which includes the recording of the wheel/rail source intensity and of the noise propagation with ability to evaluate the effect of modifications at source level

(e.g. grinding, rail dampers, wheel dampers, change in resiliency of wheels and/or rail flanges) and of modifications in the propagation path (absorbers at the track base, noise barriers, screening screens for detailed categorizing of measures and of testing individual measures).

A relevant combination of existing solutions was selected in function of the simulation results.

Three distinct existing solutions were designed in detail aiming at a high rolling noise absorption and not affecting the normal operation of the metro system:

- Action 1: Implementation of sound absorbing presat elements (granite type) horizontally distributed in the track bed;
- Action 2: Implementation of an absorbing noise barrier with a height of 1.10 - 1.20 m above rail level and close to the track and vehicle;
- Action 3: Installation of rail dampers at the selected track. The selected solutions were implemented on site and the global performance was measured step by step for comparison with simulations.



Figure 3 - Mitigation measures (all solutions) at the Athens Metro Line 1 test site: left, horizontal panels; "sound barrier" panels; middle, noise barrier with vertical absorbing panels; right, rail dampers installed

Figure 4 shows the calculated global sound level in dB(A) in the frequency range between 500 and 5000 Hz, where both the effect of the absorbing panels in the vicinity of the track, and the effect of the rail dampers in an overall reduction of the source pressure level are observed.

Figure 5 shows the sound pressure level in dB(A) computed by BBN and measured on site. The overall noise level before installation was 78.5 dB(A), while after installation of all three mitigation measures is reduced to 69.5 dB(A), resulting in a predicted overall gain of 9.0 dB(A).

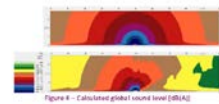


Figure 4 - Calculated global sound level (dB(A))