ROBUST Road Barrier Upgrade of Standards

Robust Project.

Deliverables D.3.3

New lightweigth mounting block. Preliminary analysis of data

Author:Vittorio Giavotto, Marco Anghileri

Dipartimento di Ingegneria Aerospaziale - Politecnico di Milano
34, via La Masa
tel: 02 23998316
fax: 02 23998334
e-mail: anghileri@aero.polimi.it

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Introduction

On November 17 2004 TRL performed the first test with the lightweight mounting (composite). This test was a repetition of the second Round Robin test, same car same barrier. The purpose of this test was to evaluate a new lightweight mounting block for the accelerometers designed to decrease the influence of low frequency components (below 20 hz) on the evaluation of the severity indices.

A first analysis of these results are reported in this document.

Structural behaviour.

Detailed information are not available now but the structure of the mounting itself seemed not to show any damage during the test.

Data analysis

Frequency analysis:

During the test two set of accelerometers have been mounted on the car. The first on the new mounting and the second on the floor of the car. In the following figure (Figure 1) the comparison between the spectrum of these two set is reported.

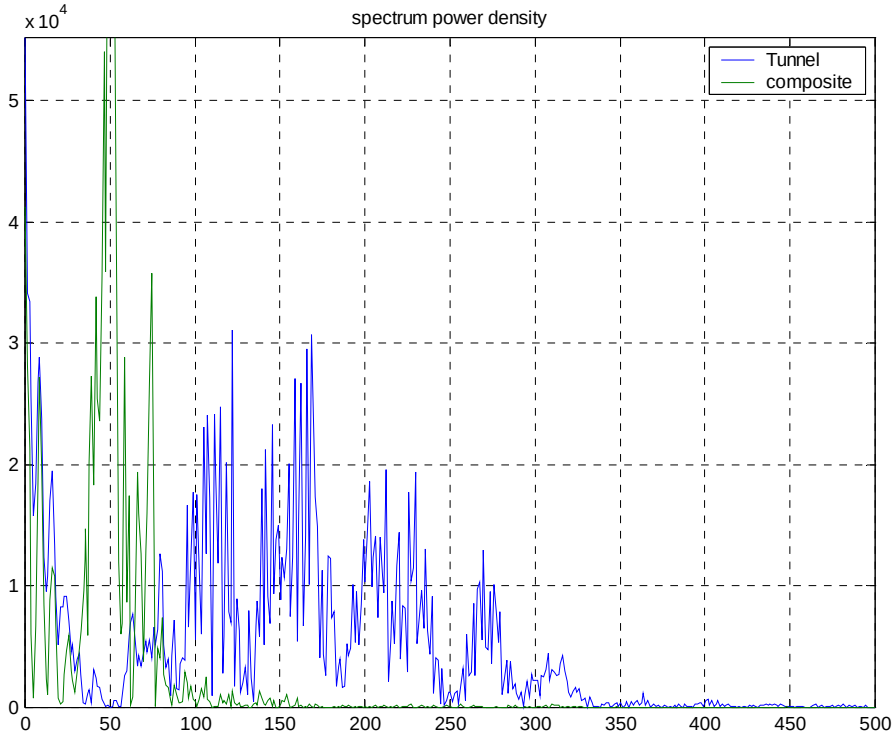


Figure 1: spectrum comparison, blue tunnel, green new mounting.

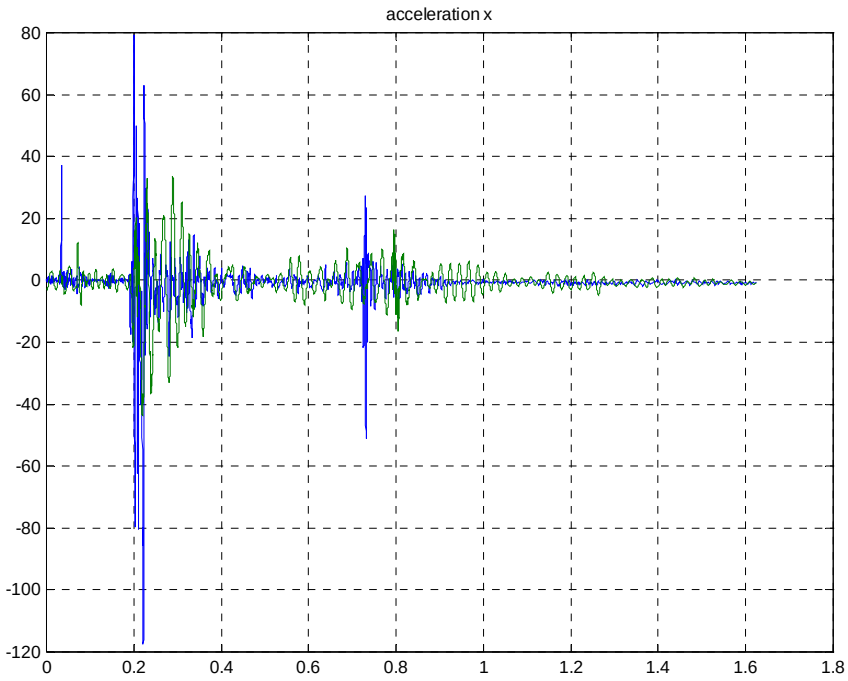
This figure shows three important results:

1. The frequency content at lower frequency (below 20 hz) is lower for the new mounting than for the second set of accelerometers.
2. The frequency content at higher frequency is lower for the new mounting than for the second set of accelerometers.
3. The new mounting block shows a strong resonance peak at 50 hz (any contribution from AC supply has been excluded).

These points demonstrate that the purpose of the task seems to be achieved because the unwanted frequency are shifted at higher values.

Time analysis.

Time analysis shows that acceleration measured on the new mounting are always lower than the acceleration measured on the second set. This is clearly shown in the following figures with unfiltered results:



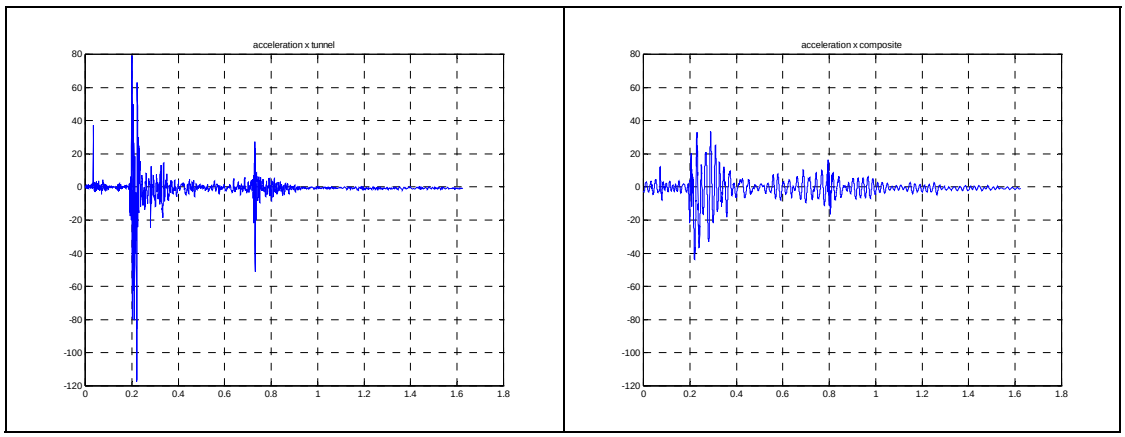


Figure 2: x component, blue tunnel green composite.

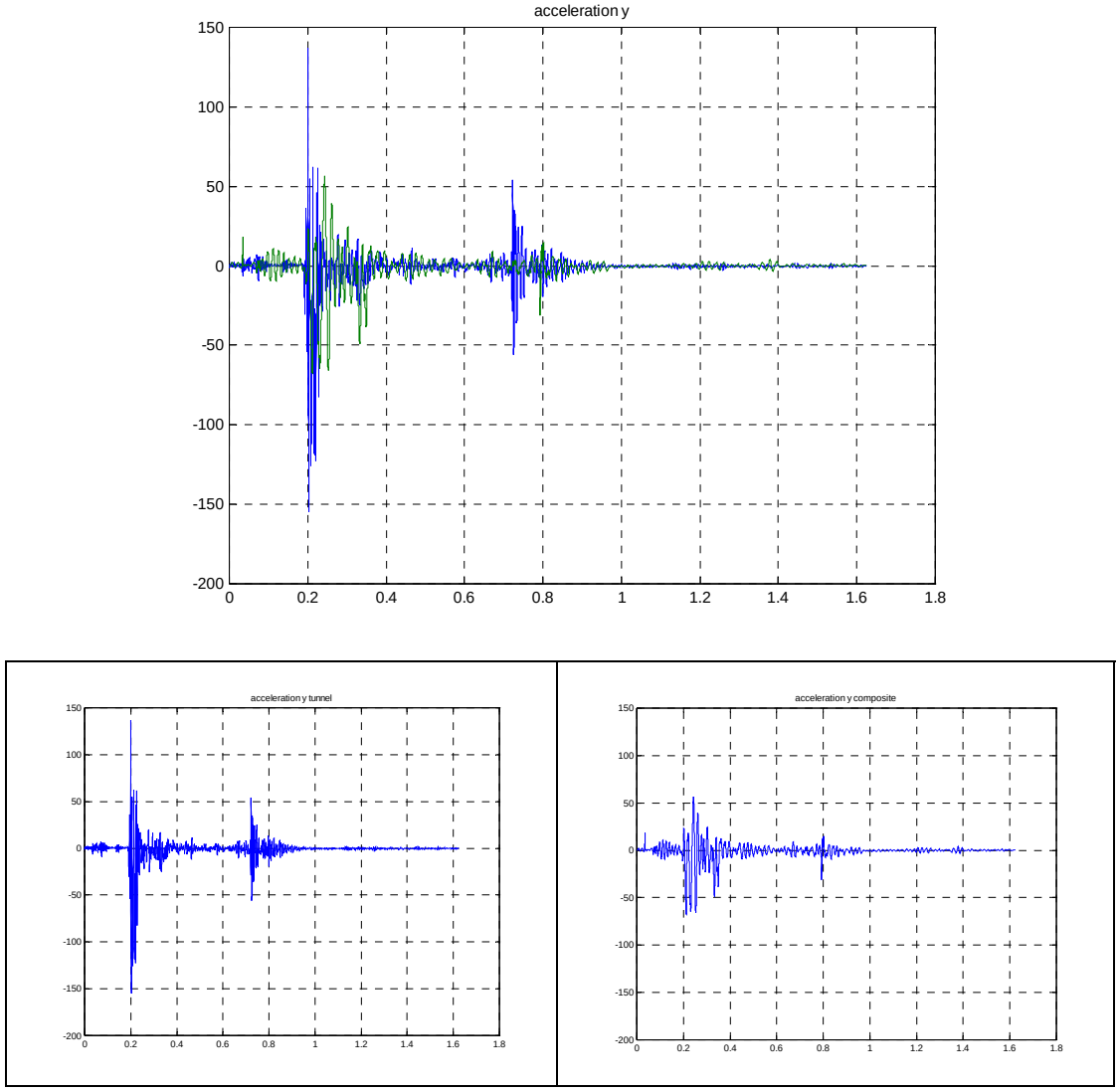


Figure 3: y component, blue tunnel green composite

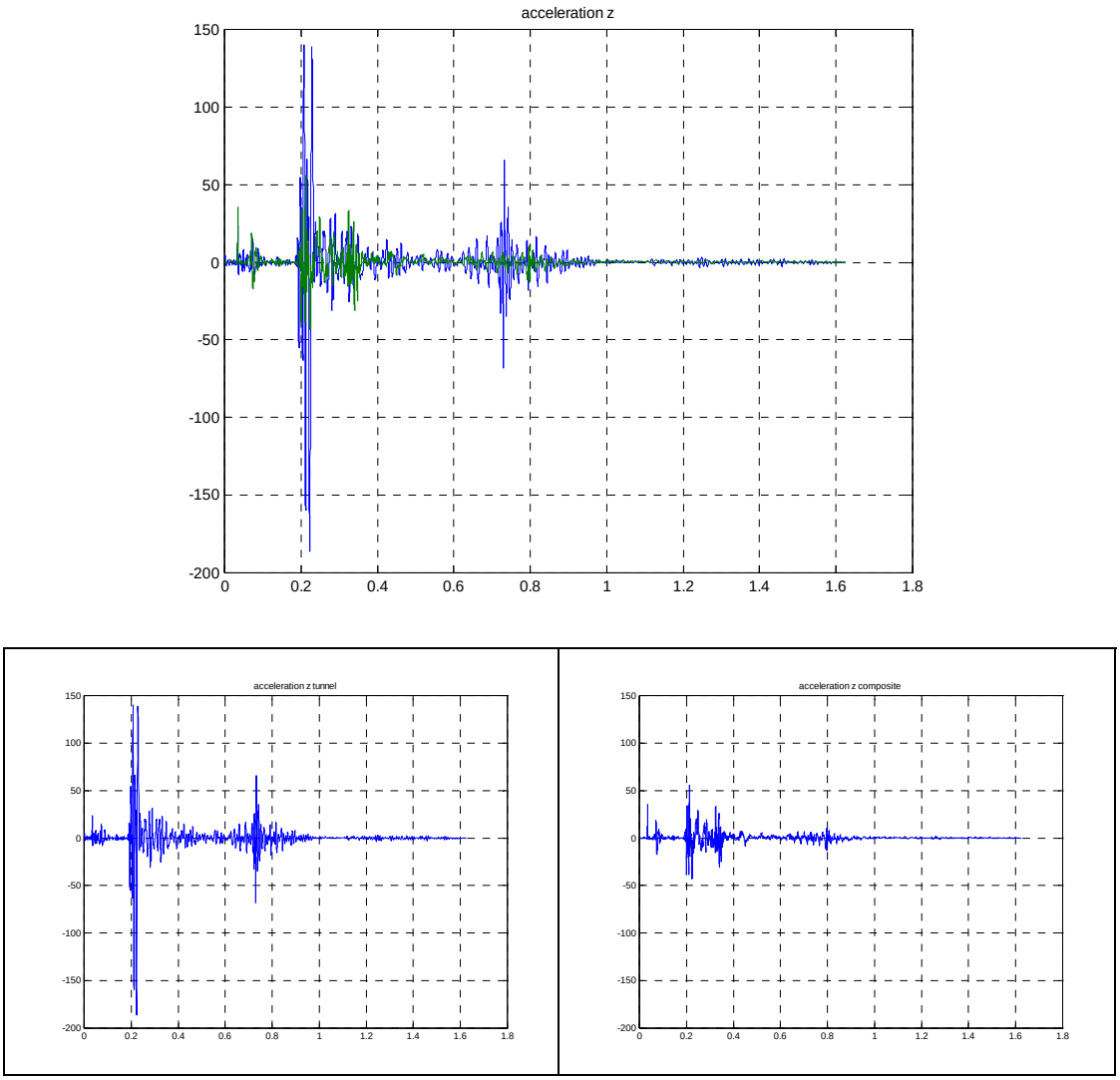


Figure 4: z component, blue tunnel green composite

The same comparison is reported filtering data at 20 hz:

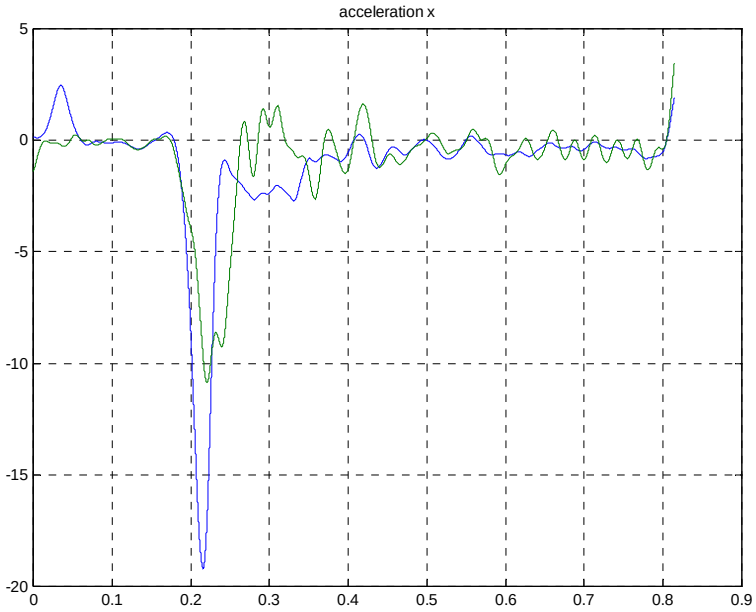


Figure 5: comparison between acceleration filtered at 20Hz. X component.

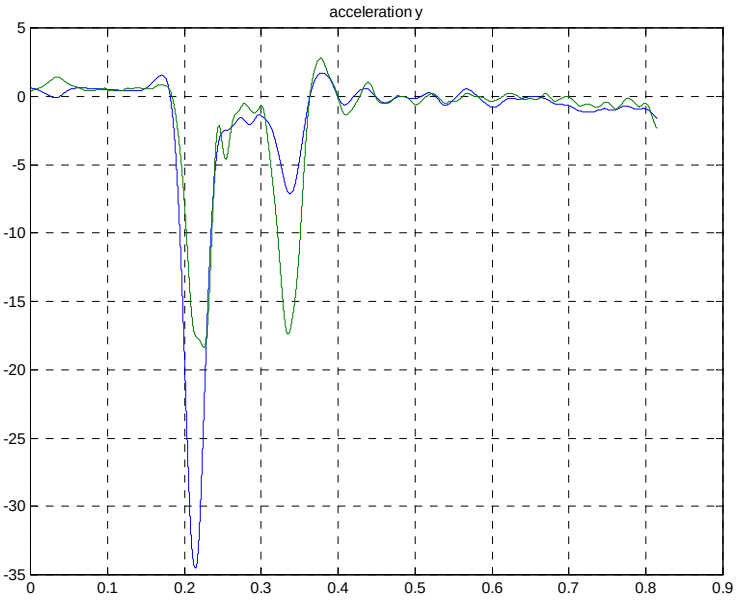


Figure 6: : comparison between acceleration filtered at 20Hz. Y component.

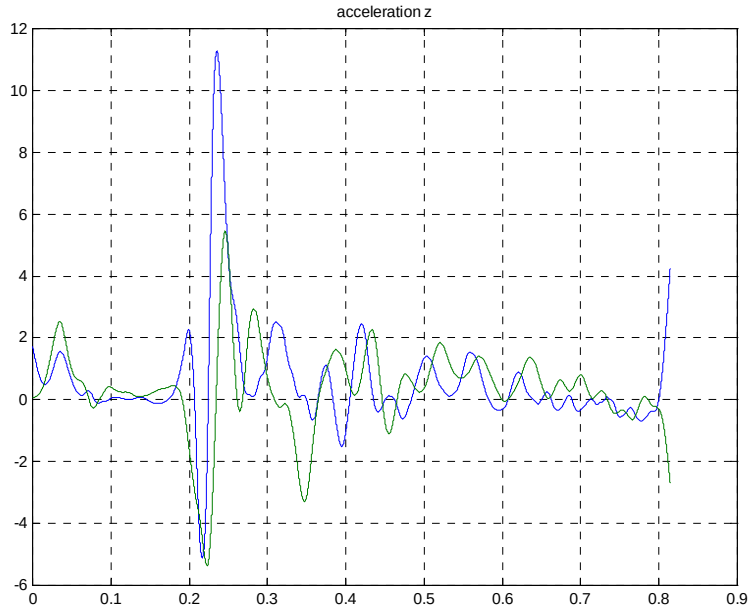


Figure 7: : comparison between acceleration filtered at 20Hz. Z component.

Can be noted that accelerations time history measured on the tunnel does not show the typical second peak related to the impact of the rear part of the vehicle while composite acceleration shows this second impact (see to Asi time history).

Severity indices

Severity indices measured on the two sets of raw data show a much lower level of Asi (as shown in Figure 8) and THIV but an higher level of Phd.

Figure 8:Asi time history. Blue tunnel, green composite.

The complete comparison is:

	ASI	Thiv	Phd
Tunnel	2.75	38.7 (t=.2531)	11.7
Composite	1.97	24.3 (t=.2883)	31.2

These differences can be founded:

For ASI and Thiv in the lower level of acceleration measured on the composite structure. For Phd in the absence of the second peak in the acceleration measured on the tunnel.

Conclusion

The previous results show interesting aspects that should be further investigated. Preliminary analysis shows a basic success: the mechanical noise affecting acceleration measurement is concentrated around 50 hz and less influencing severity indices.

In conclusion our suggestion is to use this system again but in a different laboratory to confirm the above briefly described points.