LÄRMSPOILER, FRIENDLY NOISE
INNOVATIVE NOISE ABATEMENT TECHNOLOGY ALONG TRACKS AND ROADS

INTRODUCTION

Noise abatment barriers along railway tracks and motorways are essential elements of environmental protection. Essential improvments of the shielding performance, acoustic quality and design is urgently needed.
The European Parliament and Council has established new standards of tolerance versus traffic noise: e.g. for housing areas:

Day 55 dB(A)
Night 45 dB(A)

To meet these improved environmental standards more and higher noise barriers are requested. Eventually noise abatement tunnels will be necessary. Noise is the cause of mental depression and physical exhaustion of people. It is one of the biggest hazards to the human sanity in towns and country.

Improved noise abatement is a growing challenge to town planning, road design and relevant industry and engineering.
The new European standards require action plans on national basis until 2007 including noise protection plans covering the whole country. Action and new standard plans will have to be implemented not later than 2012. Article 154-156 EGV represent the basis for international actions along TEN routes.
Densly used motorways and high speed railway tracks within and without TEN routes suggest rapid improvement of noise abatement measurements.

Noise as environmental nuisance is afflicting a growing percentage of the European population. Improved noise abatement is necessary both open country and urban settlements.

CHALLENGES

Setting priorities to meet the challenge

1. Avoid noise
2. Abate noise:
    a) Active options tire profiles, whispering roads, silent engines, antivibration cushions.
    b) Organization no traffic at night and on Sundays, speed limits, modal split
    c) Passive precautions on buildings i.e. walls, windows
    d) Active / passive precautions along traffic routes

- Earth dams
- Noise protection walls
- Noise protection tunnels (or semi tunnels)

Our project is dealing with noise protection walls, which are horizontaly assembled and supported by tilted and curved vertical columns. There are absorptive pads integrated into the support construction. The top edge is of round shape and soft absorptive material and tilted outwards (!).

CALMA-TEC Lärmspoiler ®

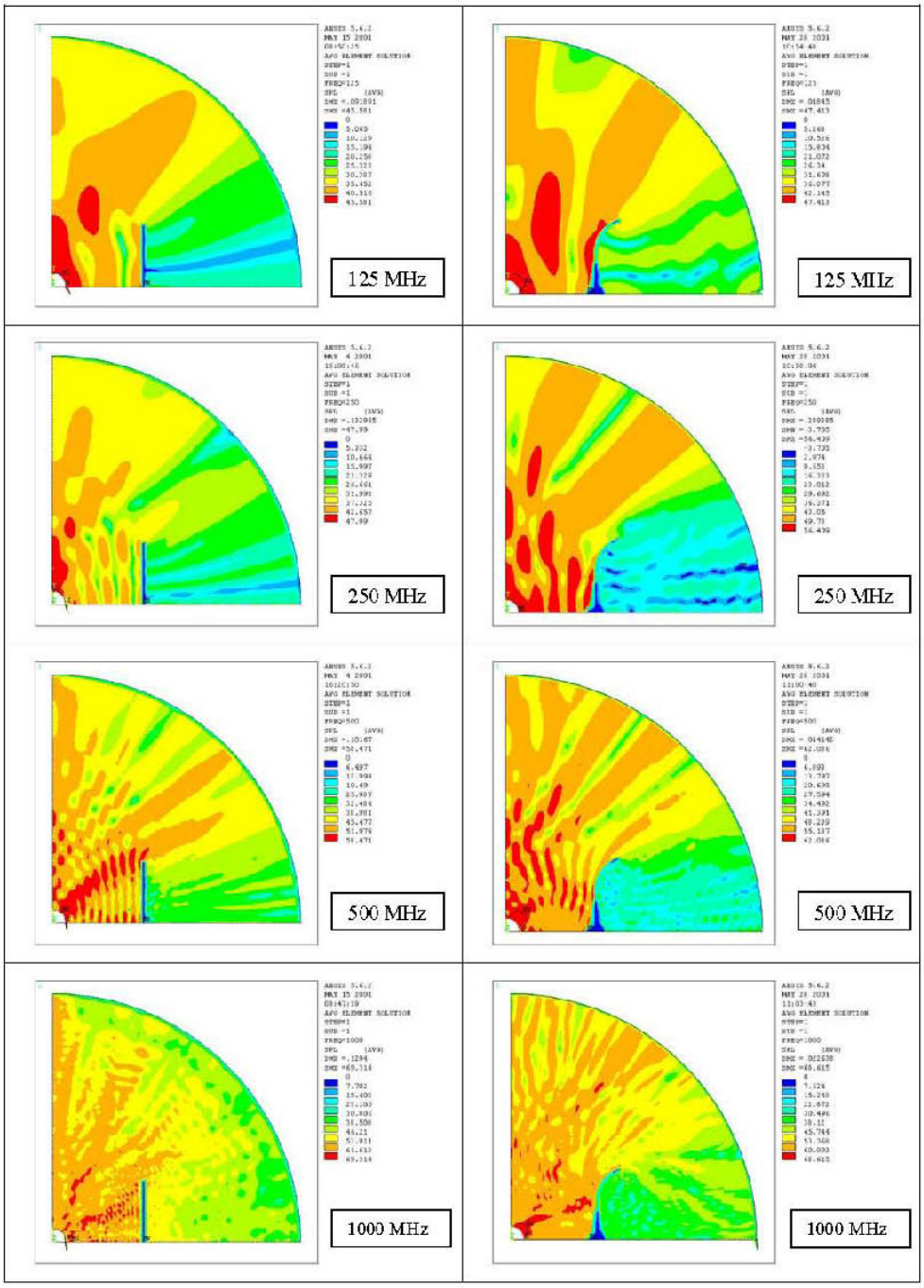
We developed a new high efficient noise barrier (patented as LÄRMSPOILER®) within the last 10 years through research, empirical testing and prototype studies. LÄRMSPOILER® has proved substantial better noise shielding performance compared to traditional products. A prototype of 2 m height realized for the Deutsche Bahn AG in Bavaria shows a performance of 4,5 dB(A) better than calculated traditional noise barrier of the same height. This is equivalent to a double loudness shielding performance.
The most innovative element of the LÄRMSPOILER® is the special design of the refraction edge, the design and use of special shapes and materials. Another element is the durability, static and dynamic performance for high speed train air shocks (5 million of 300 km/h).

OBJECTIVES OF CALM TRACKS PROJECT

In the moment we are leading an international EU funded CRAFT Research and Development Program with the following objectives and / or results:

Research and scientific evidence of the outstanding noise shielding efficiency of the LÄRMSPOILER®

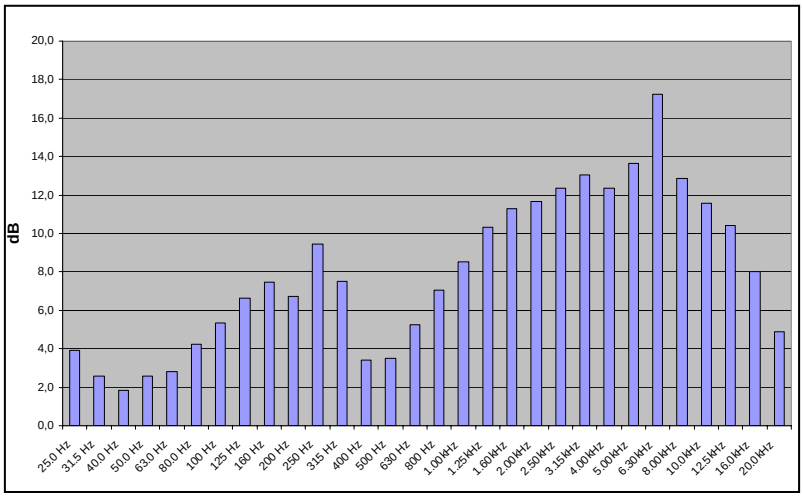
1. Less noise behind the wall. The curved shape of the wall proves more noise shielding efficiency than a straight upright wall of the same hight.



traditional barriers with hard refraction edge

CALMA-TEC Lärmspoiler with special soft and curved refraction

Noise protection by straight walls so far was not more than fencing off the noise.
Walls are growing higher and higher taking away the free view of the landscape.
No attention was paid so the particular shielding values of a noise barrier.
Absorption values measured in laboratories do not comply with shielding performance on site. We think that beyond the absorption values the shielding effects are of importance.

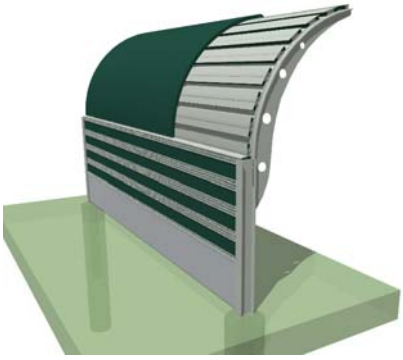


The shielding performance varies in different frequencies.
The general shielding effect is elevated compared with traditional barriers
We realize masking effects , so that the noise behind the wall appears friendly and non chaotic. Psycho-acoustic studies are being carried out at the moment in order to specify a desired soundscape and design the barrier accordingly. We believe that the modification of the ugly chaotic noise into friendly noise is possible.

LÄRMSPOILER ®
in Bavaria, Brannenburg rendering better noise shielding than traditional straight walls:
4,5 dB better shielding

- Friendly noise behind the wall: improvement of noise spectrum and psycho-acoustic effects. As sound shielding performs differently according to frequencies, we realized that we could create a more sympathetic acoustic climate behind the wall.

2. Innovative design and construction of LÄRMSPOILERS® to meet different requirements of motorway routes and railway tracks

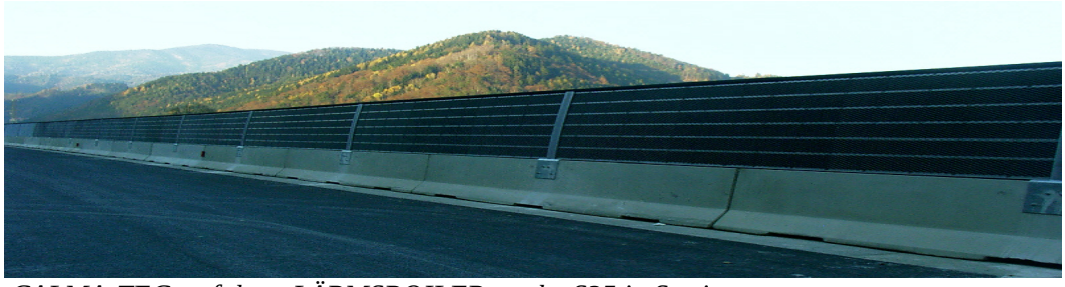


This includes the innovative design of the unique outward bent refraction edge and its acoustic performance through absorption and interference.
CALMA-TEC Lärmspoiler ® with outward bent refraction edge
As architects we are concerned about the appearance and design of the noise barriers,the overall appearance and function of the noise barrier within road and track design

- The view from the road, passengers want to see the beautiful countryside.

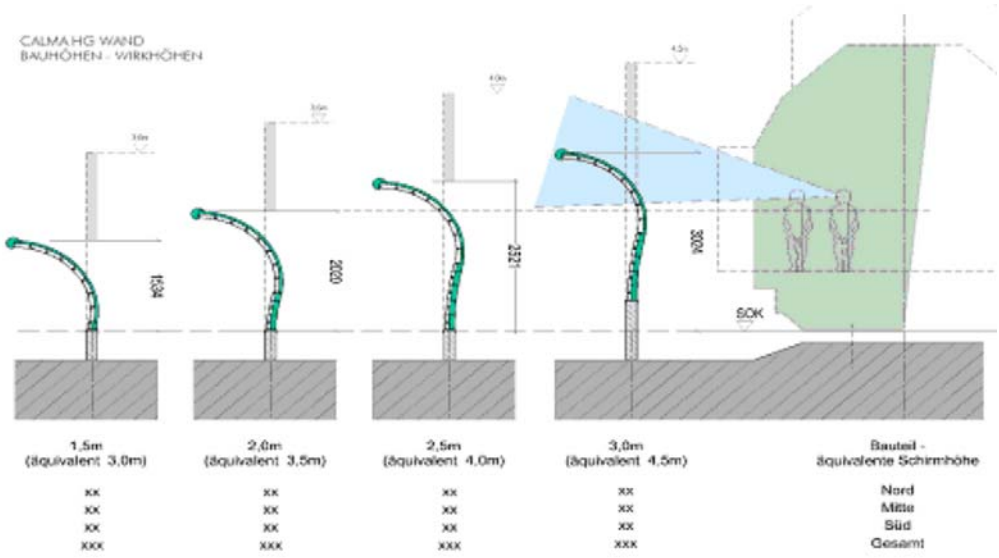
LÄRMSPOILER® design in the landscapecompared with equally effective straight wall

The reduced height of a CALMA-TEC LÄRMSPOILER® gives a better view and better noise abatement.



CALMA-TEC soft bent LÄRMSPOILER on the S35 in Styria

- The view from the train window is vital for the train passenger. The normal height of a noise abatement wall for trains would be 2,o m above rail, which is the level of the wagons window sill.

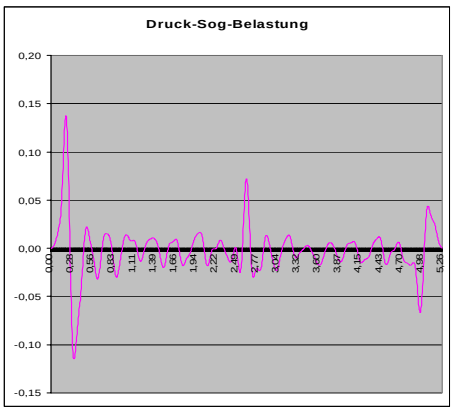


3. Technological research and development of the LÄRMSPOILER® proved valid:

- High durability and shock resistance (for high speed trains over 300 km/h)
- Due to heavy duty construction
- Extruded aluminium interlocking profiles
- Patented shaping and construction details

The dimensions of high-speed trains cause higher pressure-suction-loads in the front, in the middle and at the end of the duplextrain. The peak value of that

load-time-relation are near 0,61 kN/m² for 300 km/h and in a distance of 3,8m to the axis of the track. At time different load-time-relations with sinusoidal, swinging or rectangular forms are in discussion.



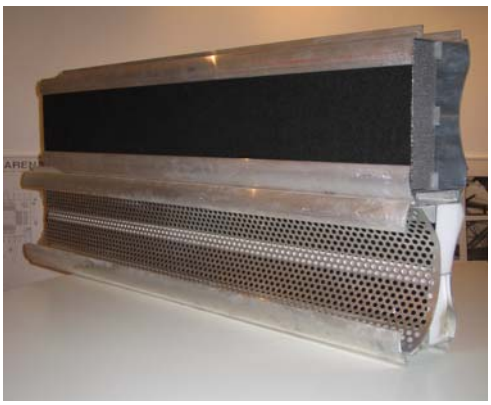
ICE trains produce vibrations which forced DB to dismount new noise protection walls near Köln

Last loadfactor-time-diagramm with pressure and suction and intermediate swinging forms. Vibration of own frequency have destroyed traditional barriers (see picture). CALMA-TEC Lärmspoiler , due to its particular strong construction is well away from that.

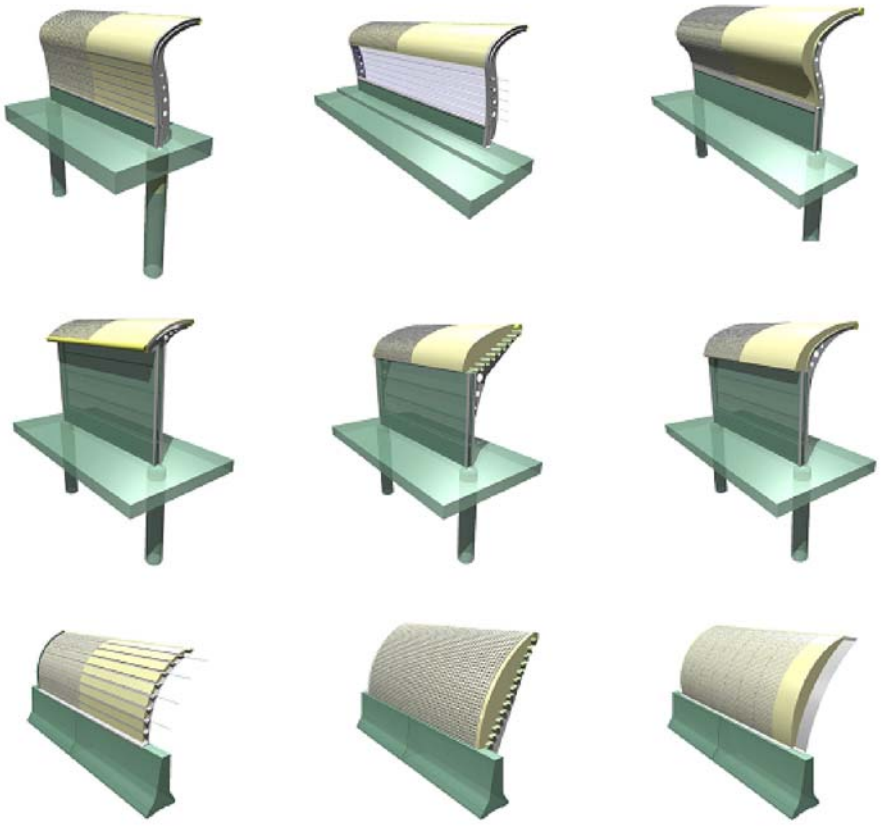
4. Acceptance and applicability

While prices of low profile market products are relatively low LÄRMSPOILER® uses high-tec details and qualified materials attaining high performance and consequently high price:

- Choice of absorptive , non hazardous materials (non fibric)
- New constructive elements, supporting and fixing materials.
- Prefabrication and fast mounting of intelligent elements



We are constantly interested to improve scientific evidence of the refraction edge performance and to provide design variations for particular users. CALMA-TEC today can offer a range of special designed LÄRMSPOILER® products:



Different solutions of CALMA-TEC LÄRMSPOILER® noise abatement wall.