Startup company of University of Twente
By: Eric de Vries
Reducing traffic noise is identified as one of the key priorities of Dutch and European environmental policy.

The three main causes of noise nuisance are:

1. Road and Rail traffic
2. Neighbours and Airplanes
3. Industry
NOISE MITIGATION
SILENT ROAD SURFACES

<table>
<thead>
<tr>
<th></th>
<th>DAB</th>
<th>ZOAB</th>
<th>Tweelaags ZOAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_{wegdek}$ IPG mix</td>
<td>0</td>
<td>4.0</td>
<td>6.0</td>
</tr>
<tr>
<td>$C_{wegdek}$ Lichte motorvoertuigen 115 km/h</td>
<td>0</td>
<td>3.7</td>
<td>5.9</td>
</tr>
<tr>
<td>$C_{wegdek}$ Zware motorvoertuigen 85 km/h</td>
<td>0</td>
<td>4.3</td>
<td>6.1</td>
</tr>
<tr>
<td>Levensduur</td>
<td>12</td>
<td>10</td>
<td>8</td>
</tr>
</tbody>
</table>

RELATIVELY INEXPENSIVE, LIMITED LIFE TIME, NOISE REDUCTION MAX. 4 dB(A)
NOISE MITIGATION
NOISE BARRIER (SCREENS)

- HIGH NOISE REDUCTION 10 dB(A), EXPENSIVE, BLOCKS THE VIEW, GRAFFITI
DIFFRACTORS
DIFFRACTING ELEMENTS ALONGSIDE THE ROAD

- NOT REDUCING BUT BENDING SOUND WAVES IN AN UPWARD DIRECTION
  - DIFFRACTION = CHANGE THE DIRECTION OF THE NOISE
  - DIFFRACTION BY MEANS OF RESONATING ELEMENTS ALONGSIDE THE ROAD
DIFFRACTORS
COMPUTER SIMULATIONS

- ONE SINGLE RESONATOR

![Diagram showing a single resonator with a quieter zone and a louder zone. The source is at the bottom and the resonator is marked by a yellow outline.](image-url)
DIFFRACTORS
FURTHER DEVELOPMENT

AFTER POSITIVE LAB-TESTS AND FEASIBILITY TEST WE IMPROVED THE SYSTEM REGARDING:

- IMPROVED NOISE REDUCTION
- IMPROVED SAFETY (MOTORCYCLISTS)
- MAINTENANCE
- DRAINAGE
- DURABILITY
- MANUFACTURABILITY

RESULTING IN SEVERAL PILOT PROJECTS IN COOPERATION WITH RIJKSWATERSTAAT AN SEVERAL PROVINCES.
RESULTS
SEVERAL PILOT PROJECTS
RESULTS
3E PILOT HUMMELO (DOUBLE ROW DIFRACTORS)
DIFFRACTOREN ON A LOW BARRIER (90 CM)
PILOT

prototype diffractor
90 cm high

Measurements
Longer distance
Up to 10m high
DIFFRACTOREN OP EEN LAAG GELUIDSCHERM
30 METER AFSTAND, BRONAFSTAND OP 10,5 METER

PERFORMANCE EQUAL TO A SCREEN OF 3 METER HIGH WITHOUT LOSS OF VIEW ON SURROUNDINGS
DIFFRACTOREN ON A LOW BARRIER
VIEW FROM ROADSITE

Sight from passing cars
Diffractors on a low barrier
pilot Prorail (Dutch Railways):
ADVANTAGES / DISADVANTAGES

ADVANTAGES

- SIMPLE, LOW COST, SUSTAINABLE SOLUTION AT 50% OF THE COSTS
- DOES NOT BLOCK THE VIEW, LIMITED SPACE NEEDED
- NO BUILDING PERMITTS NEEDED
- CAN EASILY BE COMBINED WITH SILENT ROAD SURFACES (UP TO 8 dB(A) IS POSSIBLE)
- THE REDUCTION DOESN'T DECREASE AFTER YEARS LIKE SILENT ASFALT DOES.
- CAN EASILY BE COMBINED WITH SOUND BARRIERS

DISADVANTAGE

- NEED SOME DISTANCE BETWEEN SOURCE AND OBJECT
## COMPETITION DIFFRACTORS

<table>
<thead>
<tr>
<th>Measure</th>
<th>Costs [1/M]</th>
<th>Life Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>SILENT ROAD SURFACES</td>
<td>€. 150,-</td>
<td>7-10 YEAR</td>
</tr>
<tr>
<td>DOUBLE LAYER POROUS ASPHALT</td>
<td>€. 350,-</td>
<td>7-10 YEAR</td>
</tr>
<tr>
<td>DIFFRACTOR</td>
<td>€. 125,-</td>
<td>&gt;30 YEAR</td>
</tr>
<tr>
<td>NOISE BARRIES</td>
<td>€. 1.000,-</td>
<td>&gt;30 YEAR</td>
</tr>
<tr>
<td>DIFFRACTOR LOW BARRIER</td>
<td>€. 500,-</td>
<td>&gt;30 YEAR</td>
</tr>
</tbody>
</table>
OUR CHALLENGE !!!!!!

INNOVATION VS REGULATIONS AND LEGISLATION VS

- ADVANTAGE
  - NEW LEGISLATION CALLS FOR INNOVATION

- PROBLEMS
  - INNOVATIONS DO NOT FIT INTO EXISTING REGULATIONS / STANDARDS
  - COMPLICATED PROCEDURES TO CHANGE REGULATIONS
  - RISK AVERSE BEHAVIOR
  - LIMITED KNOWLEDGE AUTHORITIES (GENERALISTS)
  - NIH (NOT INVENTED HERE) BY EXPERTS
- NO RISK, NO INNOVATION

- NO INNOVATION, NO PROGRESS