Intelligent Route Guidance for Heavy Goods Vehicles

Sustainable Surface Transport 1.6.2

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Vehicle/Infrastructure interaction models

HeavyRoute aims at deriving the safest and the most cost effective routes for road freight transports throughout Europe.

Basic concept of routing; finding the shortest (or fastest) route.
In HeavyRoute not only the shortest route is searched but also the "greenest", safest and with least damage on road and bridges.
Recommended routes

Steps to derive recommended routes

Kees Wevers, NAVTEQ
Leif Sjögren, VTI
Gunnar Lindberg, VTI

Road data
HGV data
Traffic data

Models

Effects
Evaluation, cost functions
Vehicle/Infrastructure interaction models

- HGV attributes/restrictions
  - Prefered network

Road Characteristics
- Alignment
- Condition

HGV Characteristics

Traffic Data/road category

Other/population density

Allowable routes

- Environmental impact
- Safety
- Ride Quality
- Vehicle Operating Costs
- Road Damage

Recommended routes
Vehicle/Infrastructure interaction models

No new models have been developed in HeavyRoute, but some of the selected models have been adapted.

Trans-European models have been prioritized.
# Fusion of database information

<table>
<thead>
<tr>
<th>Road data</th>
<th>Road category (static data)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alignment (static data)</td>
</tr>
<tr>
<td></td>
<td>Condition (periodic data)</td>
</tr>
<tr>
<td>HGV characteristics</td>
<td>e.g. Height, width, load factor, number of axles</td>
</tr>
<tr>
<td>Traffic data</td>
<td>Traffic flow</td>
</tr>
<tr>
<td>Other data</td>
<td>Population density</td>
</tr>
</tbody>
</table>
Environmental effects/ fuel

**Input**
- Longitudinal slope
- Road category
- Urban/Rural
- Signed speed
- Traffic state
- HGV category*
- Euro class
- Load factor

**Model**
- ARTEMIS
- Fuel consumption cost

* including max allowed speed

**EURO/metre**
Environmental effects/ Air pollution

Input
Longitudinal slope
Road category
Urban/Rural
Signed speed
Traffic state
HGV category*
Euro class
Load factor

Model

ARTEMIS
(NO x and PM)
Air pollution cost
EURO/metre

* including max allowed speed
Environmental effects/ Climate

Input
- Longitudinal slope
- Road category
- Urban/Rural
- Signed speed
- Traffic state
- HGV category*
- Euro class
- Load factor

* including max allowed speed

Model

ARTEMIS
(CO₂)
Climate cost

EURO/metre
Environmental effects/ external noise

Input
Number of axles
Speed
Population density
Noise reduction

Model

HARMONOISE
External noise

EURO/metre
Safety

Input

Signed speed
Road type/number of lanes
Vehicle max allowed speed (Road width)

Model

SAFETY

Accident cost

EURO/metre
Ride quality

Input
Left and right longitudinal profile

Model
HATI
Ride quality

Heavy Articulated Truck Index
mm/m
Road damage

Input

Structural condition based on rut depth and crack development HGV load

Model

Cracking index
SCI300*
ESAL*
EALF*

Road deterioration
Road cost
EURO/metre

*SCI300=Surface curvature Index 300 mm
ESAL=Equivalent Standard Axle Load
EALF=Equivalent Axle Load Factor