

HeavyRoute: Pre-trip routing application

Silke Forkert, PTV Planung Transport Verkehr AG
Brussels, 10.06.2009



**HEAVY
ROUTE**





Contribution of PTV:

1. Aggregation of formats and sources of available dynamic data
2. Development of the „pre-trip routing application“ supporting truck profile specific route calculation
3. VISUM simulation of truck routing for the South of Sweden

Pre-trip routing application

Aim of the pre-trip routing application:

Providing the best alternative route for a heavy goods vehicle, based on additional parameters like:

1. fuel consumption
2. CO₂-emissions
3. effects on the infrastructure
4. traffic safety and driver comfort




Pre-trip routing application

What has been done:

1. Definition of HeavyRoute modes (lowest fuel consumption, traffic safety, driver comfort,...)
2. Additional truck attributes were integrated in a NAVTEQ Sweden map
3. The defined project use cases were implemented:
 - a. routing a heavy goods vehicle based on a specific truck profile & a selected mode
 - b. obtaining 5 allowable routes
 - c. obtaining the recommended route out of the 5 allowable routes
 - d. navigation of the driver according to the chosen recommended route

Additional truck attributes

These truck attributes were included in the Sweden map (data base NAVTEQ):

| Physical Restrictions | | Hazardous Materials Restrictions | | Legal Restrictions | | Warning Information | |
|-----------------------|---|---|--|--------------------|---|----------------------------|---|
| Height Restriction |  | All trucks with hazardous goods forbidden |  | Trucks not allowed |  | Steep hill downwards ahead |  |
| Weight Restriction |  | All trucks with explosive and inflammable goods forbidden |  | | | Steep hill upwards ahead |  |
| Weight per Axle |  | All trucks with natural goods that can be harmful for the water forbidden |  | | | Sharp curves |  |
| Width Restriction |  | | | | | Lateral wind |  |
| Length Restriction |  | | | | | Risk of grounding |  |

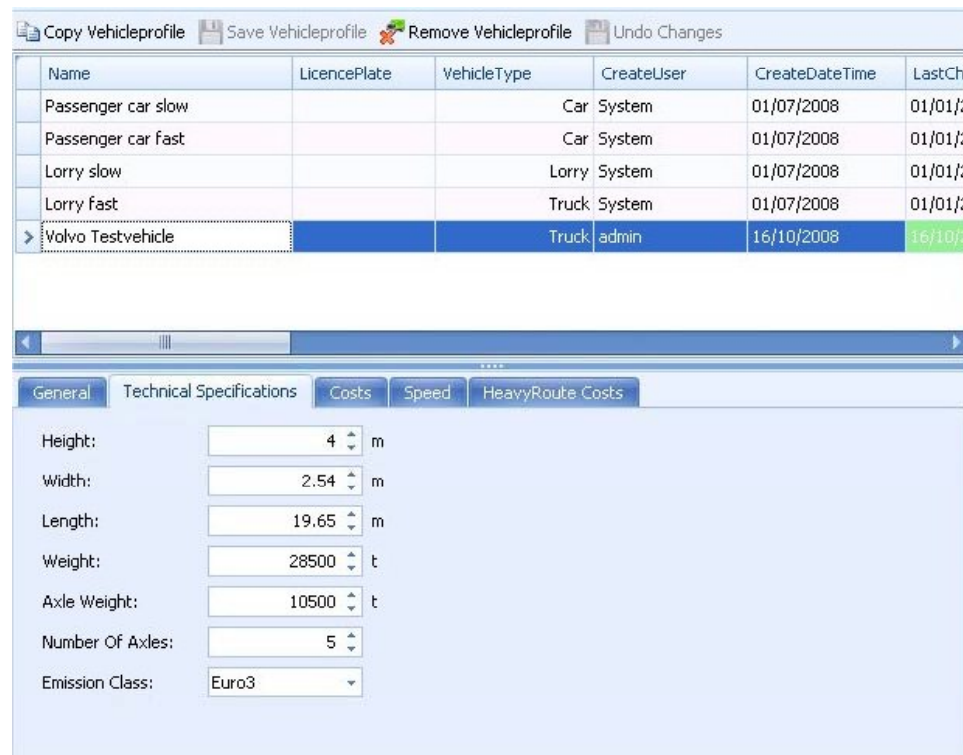
Route request I

To receive a route the user can select one of the predefined vehicle profiles:

| Vehicle class | Vehicle profile | Type | Type | Gross weight (tons) | No. axles |
|---------------|-----------------|-------|-----------------------------------|---------------------|-----------|
| 1 | Nordic European | TT/AT | Semi trailer or articulated truck | 50-60 | 7 |
| 2 | Mid European | TT/AT | Semi trailer or articulated truck | 34-40 | 5 |
| 3 | Rigid truck | RT | Rigid truck | 14-20 | 3 |

...OR

The user can create his own vehicle profile depending on the actually used heavy goods vehicle.

| Name | LicencePlate | VehicleType | CreateUser | CreateDateTime | LastCh |
|--------------------|--------------|-------------|------------|----------------|---------|
| Passenger car slow | | Car | System | 01/07/2008 | 01/01/2 |
| Passenger car fast | | Car | System | 01/07/2008 | 01/01/2 |
| Lorry slow | | Lorry | System | 01/07/2008 | 01/01/2 |
| Lorry fast | | Truck | System | 01/07/2008 | 01/01/2 |
| Volvo Testvehicle | | Truck | admin | 16/10/2008 | 16/10/2 |

| | | |
|------------------|------------------------------------|---|
| Height: | <input type="text" value="4"/> | m |
| Width: | <input type="text" value="2.54"/> | m |
| Length: | <input type="text" value="19.65"/> | m |
| Weight: | <input type="text" value="28500"/> | t |
| Axle Weight: | <input type="text" value="10500"/> | t |
| Number Of Axles: | <input type="text" value="5"/> | |
| Emission Class: | <input type="text" value="Euro3"/> | |

Route request II

Additionally the user can choose the following vehicle info:

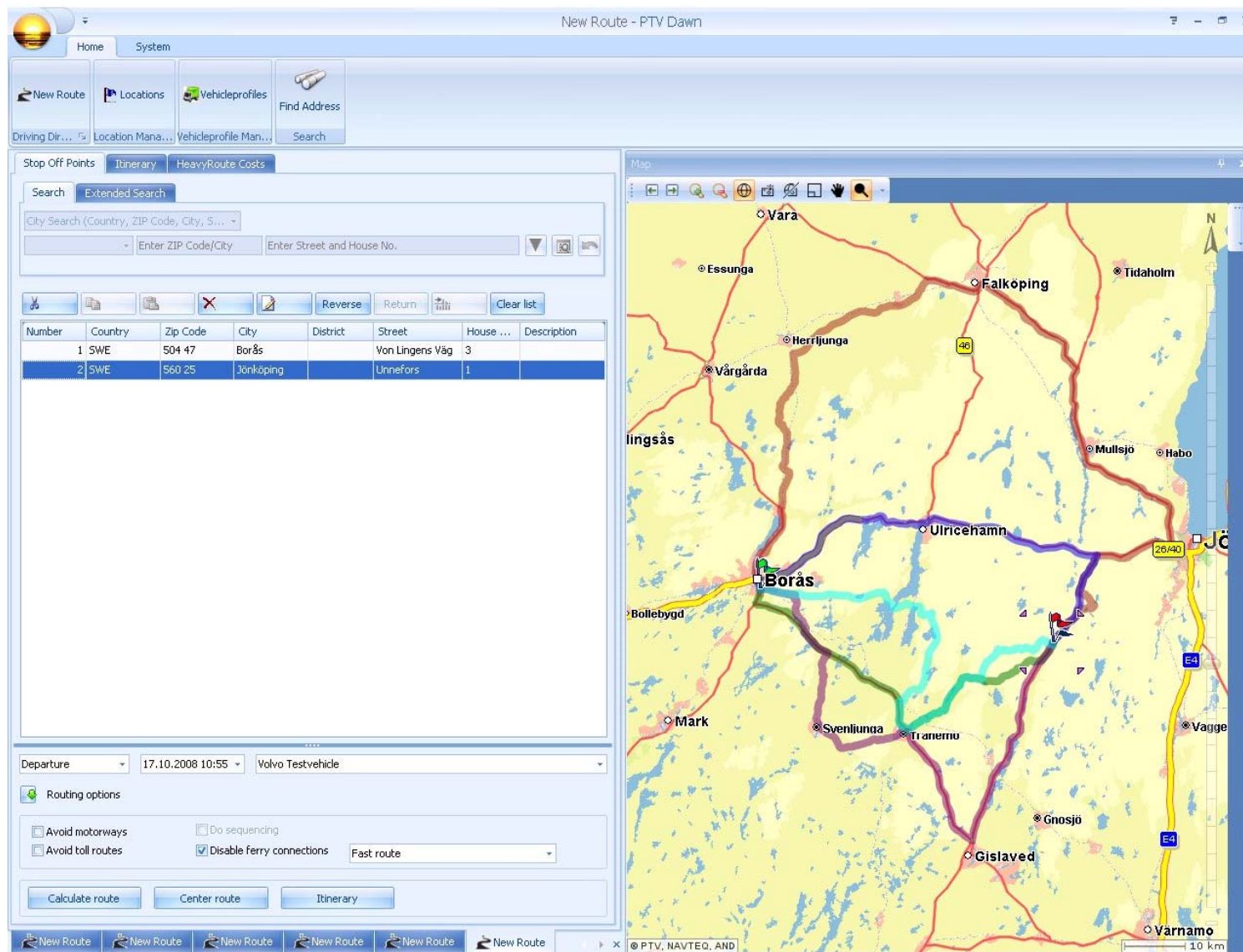
- Selection of the emission class of the used truck (Euro 1 – Euro 4)
- Selection of the actual load class of the vehicle (empty = 0%; partially loaded = 50%; full = 100%)
- Noise reduction (Yes – No)

The route request includes the following information:

- Starting and end point
- Starting date/time
- HeavyRoute mode for the calculation of recommended routes



Calculation of 5 allowable routes



Stop Off Points

| Number | Country | Zip Code | City | District | Street | House ... | Description |
|--------|---------|----------|-----------|----------|------------------|-----------|-------------|
| 1 | SWE | 504 47 | Borås | | Von Lingsens Väg | 3 | |
| 2 | SWE | 560 25 | Jönköping | | Unnefors | 1 | |

Departure: 17.10.2008 10:55, Volvo Testvehicle

Routing options:

- Avoid motorways
- Do sequencing
- Avoid toll routes
- Disable ferry connections
- Fast route

Buttons: Calculate route, Center route, Itinerary

To obtain the 5 allowable routes a routing is done taking into account all relevant parameters (*additional truck attributes, vehicle data and selected mode*).

User interface of the routing application

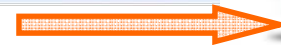
The recommended route

The 5 allowable routes are displayed with all relevant costs.



| Route | Total distance | Total time | Emission costs | Fuel |
|-------|----------------|------------|----------------|------|
| 1 | 82.42 | 00:58:10 | 0.00 | 0.00 |
| 2 | 71.81 | 00:57:14 | 0.00 | 0.00 |
| 3 | 110.81 | 01:32:24 | 0.00 | 0.00 |
| 4 | 94.46 | 01:31:17 | 0.00 | 0.00 |
| 5 | 179.17 | 02:28:28 | 0.00 | 0.00 |

The user of the system can choose one of the routes depending on his desired mode.



The chosen route can be handed over via a dedicated interface to the truck navigation system of PTV.

Routing example: Truck navigation simulation

Route Description



Length: 3.3 km Duration: 0:03 h
0 m 0:00 h
Start onto Nynäsvägen

Cancel

Simulation

Navigation

Route Description



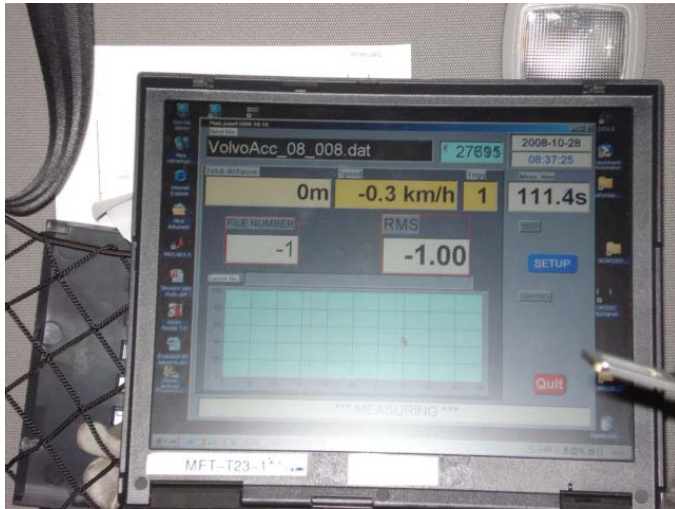
Length: 3.6 km Duration: 0:05 h
0 m 0:00 h
Start onto Nynäsvägen

Cancel

Simulation

Navigation

Field Tests in Sweden – October 2008



The results of the pre-trip routing application were tested in Sweden:

- Four runs of the test routes took place
- All data were logged per route for each of the four runs
- The whole field tests were documented in terms of protocols, deliverables and pictures

Thank you for your attention!

