Innovative Freight Delivery in Urban Space

First Results of Hanover Field Tests

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Motivation and Background for the concept

- 80% of deliveries in urban areas
- 10% of vehicles, but 20% of traffic and 50% of environmental effects
- Policy of local authorities based on restrictions, or access control
- Extra costs and less efficiency
- Propose innovative solutions to distribution logistics

Objectives

- Support an innovative approach to the organisation of urban freight transport, in line with political strategies to safeguard the « liveability » of cities, while being compatible with efficient logistics.
Involved Parties & Boundary Conditions

Public Authorities:
- Traffic
- Pollution
- Safety
- City live

Customer
- Delivery Cost
- Service quality

FIDEUS Solution

Logistics Operator:
- Efficiency
- Low costs
- Durability

Vehicle OEMs:
- Standard solutions
- Cost
FiDEUS Project Approach

Efficient urban logistics through:

- Low-emission, low-noise vehicles
- Better ergonomics and safety
- organised in compliance with City’s transport requirements
- introducing new vehicle type for last mile
Issues addressed in Hannover:

- practical experimentation with new logistics for last mile delivery in sensitive urban areas
- Search for new ways to combine 'urban comfort' for pedestrians with business needs of small shops and stores
- Reduce negative impact on traffic flow from delivery vans
- Reduce emissions in terms of noise and air pollutants
### Three Testcases in Hannover

<table>
<thead>
<tr>
<th>2nd LANE</th>
<th>URBAN LIFE</th>
<th>CITY HUB</th>
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<tbody>
<tr>
<td>2</td>
<td>3</td>
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<tr>
<td>Reduction of 2nd lane parking and its effects on traffic by implementing dedicated parking zones for delivery vans.</td>
<td>An approach to minimize illegal delivery activity within low-traffic zone and emission saving through electronic micro carriers.</td>
<td>A low-noise van in combination with an electronic micro carrier concept for delivery within large pedestrian zones.</td>
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</table>
CityHub: Problem addressed

- situation during delivery hour
- safety
- damage to pavement
- ‘livability‘
CityHub: Problem addressed

- Access restriction do not meet delivery requirements
- Pedestrian zones experience drawbacks caused by lack of logistics services
Summary Scenario ‘City-Hub’

- Time-extension for distribution (reduces number of vehicles) by placing a feeder-vehicle close to the pedestrian area, which feeds walker, biker, microcarrier.

- Legal aspects: extension of access times for pedestrian zone, permission microcarrier, reservation of feeder-space and enforcement
uCUV-Delivery Ranges

'City-Hub' Location Planning

Hannover
Delivery for Level -1 via stairs,
sometimes several vans approaching -1
Dense structure of small businesses and shops at Level -1
Reserved parking space for loading/unloading of MCUV-containers:

Depot D 1

Kröpke
Level -1
Delivery at -1
Results concerning delivery times

Duration of entries compared to permitted entry-times

- Elimination of illegal access by applying MicroCarrier
- Time extension of delivery with MCUV by factor 2.43 - see next slide!
Results concerning delivery times (2)

• Actual delivery operation reduced by approx. 20%
• Only delivery process considered - no hub-operation included (sorting to containers)
Scenario 2b: Level zero delivery (ground level):

- the Iveco is a CNG-van, noise reduced with a range of safety features for operation close to pedestrians
Scenario 2b:
Level zero delivery (ground level):
the Iveco also is used to deliver bulk packages/goods that would not fit into
the CityContainer of the Microcarrier
Noise comparison between Fideus Van (Iveco) and standard van in pedestrian zone:

Average -7db/A
Peak -10db/A
Summary Scenario: 'Urban Life'

Characteristics

- Pedestrian zone
- Mix of shopping, small business, recreation, public living space
- Tram only, bike-lane available, delivery trucks have to park on pedestrian area (very annoying to the public, illegal and risky)
Solution:
mid-size truck is parked at reserved place, uC travels on bike-lane along entire Limmerstr

MCUV passing along Limmerstr.
Between Tram and pedestrian foot walk
Operational area of Microcarrier:

1. Limmer only
2. Limmer plus surroundings
Loading zone Limmerstr.
4 different logistic cases for analysis
Savings in distance (km) only if MCUV serves entire surrounding
Increase of capacity of feeder (3) and MCUV employment delivers best savings
• value 1 (orange) represents data of 1 DHL truck, operated in 3 different cases
• All other values are extensions to all DHL, all KEP, incl Food, incl other small business deliveries
Summary  '2nd Lane Stop'  

Characteristics:

- main road (Arterial)
- 2 lanes each direction,
- traffic impact from parked vehicles (congestion, safety, legal aspect)
Summary Scenario

2nd Lane Stop

Solution:

- parking place reserved to delivery trucks (time window only), with yellow marks on ground and signposts for enforcement
- Additional ways for operator
- Problems with enforcement
Characteristics:

- Daily profile almost flat
- 1400 Vehicles/hour
- Recording of traffic profile surpassing 2nd Lane Parking with 'Floating Car'
Results 2nd lane

- 88.7% of traffic in platoons
- 33% time loss with 2nd lane occupation
- 1242 vehicles affected per hour

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<td>1398</td>
<td>FzG/h</td>
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<td>88.74%</td>
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<td>30.83</td>
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<td>39.36</td>
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88.7% of traffic in platoons

33% time loss with 2nd lane occupation

1242 vehicles affected per hour
2nd lane occupation time (hrs) | 5 | Verbrauch pro Tag bei Haltezeit X Stunden (Beispiel 10h) | 10,8926586 / 1
annual delivery days | 200 | Verbrauch bei X Tagen... (Beispiel 200) | 2178,53172 /

| 2,32 kg/l | Benzin: CO_2 nach Messung Bayerisches Landesamt |
| 2,62 kg/l | Diesel: CO_2 nach Messung Bayerisches Landesamt |

5,380,973,35 t CO₂ bei 50/50 Diesel/Benzin und 200 Tagen mit je 10h Haltezeit
Schätzung Hannover Streckennetz: Faktor 5 realisitisch!

448,414,446 km Kilometer Normalfahrzeug bei 120g/km EU Grenzwert

2200 liters of additional fuel per year
5,4 tons of CO2 (50/50 gasoline/diesel, 200 days)

45,000 km equivalent travel distance based on 120g/km EU-emission-limit
Conclusion

• Measurement of emission savings provide a 'solid tendency' for 2nd lane environmental impact;

• Extrapolation on entire urban area is possible with location specific structural data

• For more reliable emission data long term observation with more sophisticated sensor equipment required

• The MCUV concept appears promising concerning traffic reduction and service improvement but requires improvement of logistics concepts to meet commercial criteria

• These findings will be brought to the regional environmental action plan by the Region and the City of Hannover