E-Truck Overall Approach for 3-Shift Process Starts Operation

Rainer Schruth, Dipl.-Ing.
Project Manager Advanced Development, R&D
Drivers for electrified logistics:

- Legal requirements on emissions for inner city transportation
- Emissions during transport processes in the context of product manufacture

Everybody wants to see more e-trucks on the road, but nobody tells us how to get them there”

*Logistics Manager*
A Successful Project...

Magna in Graz auf elektrische Lastwagen


Graz: Magna präsentiert Elektro-Lkw-Shuttle


Emissionsfrei und beinahe lautlos

How Did This Happen?

- Was it a job that advanced all by itself?
- What kind of challenges had to be mastered?
- What was the real intention?
- What are the critical questions?
- How does it work in reality?
Task:
Making the new production hall for BiW outside the main factory area logistically accessible in order to transport vehicle bodies to the internal paint shop!
Initial Situation

- New main entrance
- Public crossing with traffic lights
- New plant
- One way: < 2 km
- Low speed

Perfectly suited for electric mobility !?!

7 stops on the way + 2 reversing procedures
Specific Requirements for the Truck

Restrictions I:

• Semitrailer truck for 2 vehicle bodies and conveyor technology
• Vehicle length (max. 13,6 m)
• Narrow situation in the dock requires precise coupling
• Short unloading and loading process in the dock (3 minutes)
• Round-the-clock operation every 10 Minutes
• Conveyor technology has to be included in the overall concept
• Back-up solutions necessary for a robust process
• Ensure back-back-up solution with manual operation
• Emergency stop for conveyor process
• Emergency process for other incidents
Specific Requirements for the Truck II

Restrictions II:

• Maintenance concept with short maintenance time
• Official road approval
• High speed for motorway (back-up truck)
• Project duration: 6 years
• Guarantee a “Green Zero”
• Affordable application for back-up vehicle necessary
• Find an implementation team

Positives:

• Only 10 tons load capacity necessary
• Nearly identical situation in the used docks (rearward loading)
• A precise parking position is needed for conveyor connection
Decision-making for Truck Manufacturer

Parameters for choice of truck manufacturer:

- Proven technology
- Flexibility for special solution
- Fit for use on public streets
- Minimal maintenance effort
- Cooperation with transport service provider and conveyor technology provider
- Long battery lifetime (over project duration) = high number of cycles
- Availability within a few months
- Affordability
Market Situation

- First series-produced vehicles not available until 2019
- Only small fleet tests
- Island solutions, mainly small segment
- No suitable semitrailer tractors available
- Trailer solution only active as an inflexible “work tool”
- Only “standard” solution expected (regarding vehicle dimensions, range, charging time etc.)
- Lack of experience with e-mobility by transport service providers
- No attractive charging solutions
We found...

Herbert Temmel GmbH
…with the courage and will to embark on this venture

Framo GmbH
…with a proven technology and the willingness to adapt the basic vehicle

BT-Anlagenbau GmbH
…with an interest in the adaptation of the conveyor technology for and in the trailer
E-Truck Solution with Framo

- Proven concept also on public streets
- 18t battery-electric semitrailer truck
- Short overall vehicle length can be implemented – wheelbase 2975 mm
- Battery for large number of charging cycles
- Flexibility for adaptations
- Different vehicles
- Maintenance concept
- Availability on time
18t battery-electric semitrailer truck; wheelbase 2975mm

“1” FRAMO e 180/140 BL

- E-motor: 140 kW
- Torque: 8135 Nm
- Battery content: 86.7 kWh
- Calculated driving range: 87 km

“2” FRAMO e 180/220 BL

- E-motor: 140 kw + 80 kW
- Torque: 12654 Nm
- Battery content: 115.6 kWh
- Calculated driving range: 16t ca. 116 km / 33t ca. 65 km

- DC charging (CCS): 50 – 150 kW
- Onboard charging system: 4 x 11 kW
- Automated charging: 33 kW (AC)
Charging Challenge with Cable Connection

- Big cables
- Long parking time
- Connection critical
Charging Challenge – Other Solutions

• Cost-intensive installations
• Unproven technology

Pantograph charging

Overhead charging

Inductive Charging

Robot Charging

Source: Scania

Source: Scania

Source: Oppcharge

Source: Evatran

Source: VW, Kuka
Charging Solution

- Conductive solution
- During loading and unloading process in the dock
- Effectively 2 minutes of charging time
- 33 kW AC
- Use also for conveyor technology
What We Achieved

What is unique about our solution?

- Silent operation (urban area)
- Elimination of local emissions
- Elimination of refueling time (over 300h)
- Energy savings (over 65%)

First project for this kind of application!

- Demand-oriented technically optimized overall concept
- 24-hour use: round-the-clock operation (3 shifts)
- Max. 3 minutes of parking time
- Fully automatic charging during loading and unloading process in the dock
- Cross-functional teamwork for the overall concept (Temmel, Framo, BT-A, Magna)
- Affordable over project lifetime
- 11-month implementation time from idea to first use (September 2016 bis Juli 2017)
Conclusion

Overall concept allows electrified transportation also with heavy-duty trucks operating under strict production process requirements

Good luck for your special transportation project!
Public Crossing and Main Entrance
Internal Route With Reversing Sequence Into the Dock