Green logistics in urban areas realized with smart (measurement) technology

Data recording

Sustainability and electrification on the road not only affect passenger transport, but also the areas of transportation and logistics. How commercial vehicles can be replaced by electric vehicles, especially on delivery routes in urban areas, confronts manufacturers with various challenges. While range and charging options are receding into the background, the peculiarities of inner-city traffic are a key issue. Many road users, narrow streets, many start and stop situations are just some of the aspects that need to be taken into account when optimizing the vehicle type. BPW Bergische Achsen KG from Wiehl in North Rhine-Westphalia (Germany) took on the task and developed an electric truck with a coaxial drive - supported by data loggers from CSM.

(BPW Bergische Achsen KG)

Required data basis

When talking about electromobility in cities, commercial vehicles cannot be left out of the equation. The logistics of the "last mile" in particular, i.e. the delivery of goods on the final leg to their destination, plays a major role here.

Low-emission, short journeys in urban areas - with a lot of downtime for loading and unloading - which in turn can be used to charge the traction battery, offer ideal conditions for the use of an electric truck.

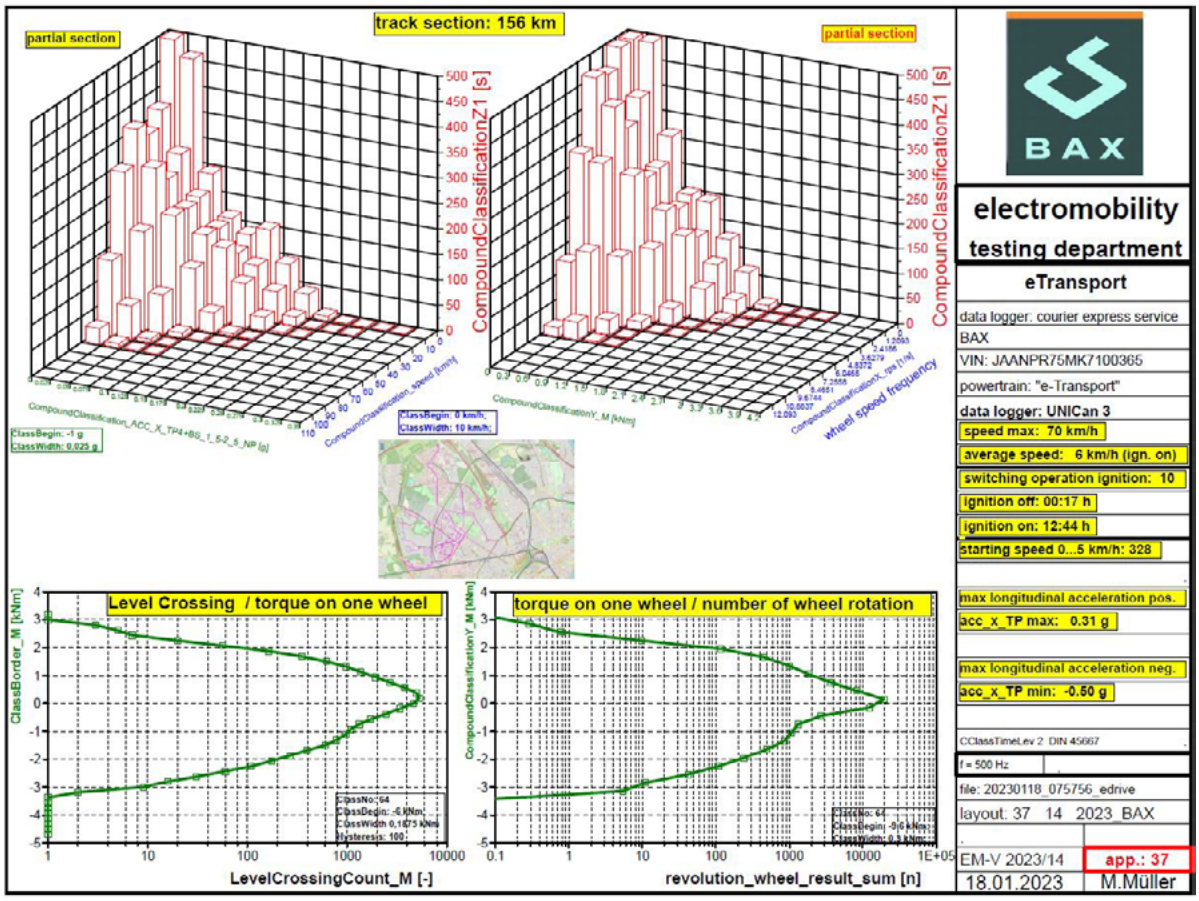

Fig. 1: Evaluation of the recorded load data in connection with GPS data (BPW Bergische Achsen KG)

BPW Bergische Achsen Kommanditgesellschaft, a global supplier to the commercial vehicle industry and mobility service provider to the transport and logistics industry, therefore wanted to develop a coaxial drivetrain for use in an electrified truck. To do this, they first needed so-called "design collectives" to design the components. These contain load data (Fig. 1) from which conclusions can be drawn as to how the vehicle must be designed for its intended purpose. These had to be recorded from journeys with conventionally fueled vehicles before the findings were transferred to a prototype and finally used in the type-approved electrified commercial vehicle.

»We already used data loggers from the UniCAN family in the pre-development phase, i.e. when evaluating the load with the combustion version of the truck. This enabled us to create a uniform data basis for further development, while the measurement technology could simply be reused for further tests.«

Matthias Müller, Team Lead Road Test - Electromobility & Innercity Solutions at BPW Bergische Achsen KG.

Technically sophisticated innovation

The electric drivetrain that was to be developed needed to have a compact package design so that it could be installed on existing commercial vehicles as well as being fitted as original equipment. The coaxial e-axle (Fig. 2) in a truck was an innovative drive solution, so one of the challenges was that there were hardly any existing reference values. For this reason, a lot of data had to be collected quickly in different situations so that it could be iteratively implemented in the prototype and then tested again.

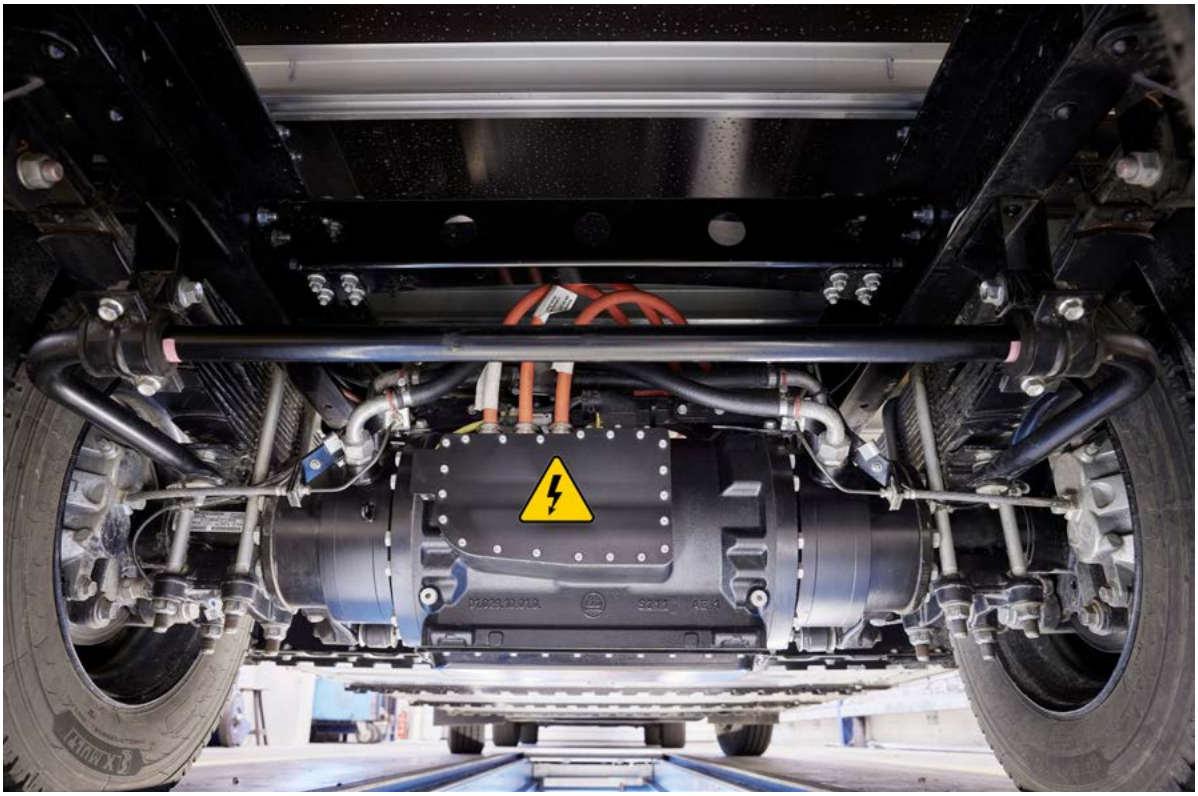

Fig. 2: eTransport from BPW, the coaxial electric drivetrain (BPW Bergische Achsen KG)

To implement the project in a time and cost-efficient manner, as many tests as possible were performed simultaneously. For this purpose, a complete system was put together using measurement technology from various manufacturers. As all signals converged in the data logger used, it was particularly important to work with a device that has open interfaces for use with other measurement technology.

»Compiling a complete system of this kind individually for the respective measurement task requires a great deal of effort, as values from a wide variety of data sources have to be brought together. This gave rise to the following main questions: How do you integrate different measurement systems into a reliably functioning overall system and does it provide the data that is required or rather how do you correct it in the event of an error?«

Udo Johannkemper, Support at CSM GmbH

Heterogeneous measurement environment - uniform results

Based on the measurement data collected, the next step was to build the first prototypes of the coaxial e-truck for further tests - again using the robust UniCAN 3 data loggers from CSM. In two prototypes (Fig. 3), which were used for further measurements on the test track and in road tests, the following measured variables, among others, were recorded:

- Accelerations, for example on the drive axle and chassis,
- Torsional vibrations on the drive shafts,
- Current and voltage from the electric powertrain,
- Temperatures throughout the vehicle,
- Pressure and flow rate in the cooling systems,
- GPS data.

Fig. 3: The development required a robust and flexible measurement system, as the prototypes were subjected to a large number of tests. (BPW Bergische Achsen KG)

The values came from a heterogeneous measurement environment with around 1,000 measurement points. These had to be merged in the CSM data logger so that the data could be analyzed and processed further. The UniCAN 3 was easy to integrate and further adaptations, including the interaction of different protocols, could also be implemented using the configuration (Fig. 4).

»Right from the start of the project, great importance was attached to a reliable and robust measurement system. The real-life environmental tests and the vehicle homologation required a DAkkS-accredited measurement system. These requirements were met with the measurement technology from CSM.«

Matthias Müller, BPW Bergische Achsen KG

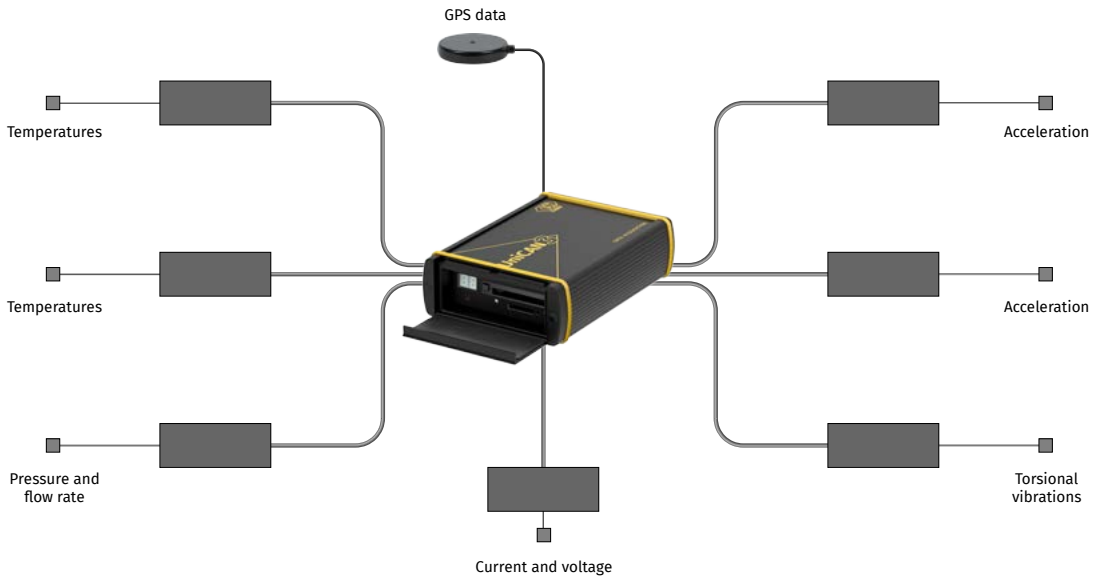

Fig. 4: The UniCAN 3 enables smooth recording of data from different sources.

When setting up a complex measurement setup consisting of components from different manufacturers, there are always challenges, such as changing signal structures or the subsequent integration of additional hardware. A flexible, adaptable system that made it easy to implement these changes improved the processes. The ability to adapt the measurement task at short notice via mobile connections also helped to ensure that the tight project schedule could be adhered to.

The CSM support team assisted with the implementation of the correct configuration of the measurement technology. A customized software feature for the data logger was also jointly developed to improve compatibility between the various configuration and analysis software.

When the new LTE mobile communications standard was established during the project period, a solution was also developed in collaboration to adapt the measurement setup to the new data transmission standard with as little effort as possible.

»The first-time consultation by CSM and the excellent support during the project were worth their weight in gold! Together, the various measurement systems were brought together, among other things. This meant that measurement data could already be used for validation in pre-development, for the prototypes and later also in field use.«

Matthias Müller, BPW Bergische Achsen KG

Many years of experience used

The easily adaptable and durable data loggers from CSM could be used in all test phases and environments and configured according to the respective requirements. CSM's support accompanied the project through the various stages and also helped to merge the heterogeneous measurement landscape - years of project experience in the implementation of UniCAN 3 in demanding test environments proved beneficial here and also helped with the implementation of this solution for an e-truck.

Featured Products

UniCAN 3

The data logger UniCAN 3 was developed especially for the use in the automotive sector: Up to 12 CAN interfaces, freely configurable inputs and outputs, Wake-on-CAN, LAN and WLAN, support of CAN FD. In addition, data transmission via LTE modem or WLAN allows worldwide use.

Complete solutions from a single source:

CSM provides you with comprehensive complete packages consisting of measurement modules, sensors, connecting cables and software - customized to your individual needs.

Further information on our products are available on our website at www.csm.de
or via e-mail sales@csm.de.

CSM GmbH Headquarters (Germany)

Raiffeisenstraße 36 • 70794 Filderstadt
+49 711 77 96 40 sales@csm.de

CSM Office Southern Europe (France, Italy)

ArchParc – Site d'Archamps • Immeuble ABC 1 – Entrée A
60, rue Douglas Engelbart • 74160 Archamps, France
+33 4 50 95 86 44 info@csm-produits.fr

CSM Products, Inc. USA (USA, Canada, Mexico)

1920 Opdyke Court, Suite 200 • Auburn Hills, MI 48326
+1 248 836 4995 sales@csmproductsinc.com

CSM (RoW)

Vector Informatik (China, Japan, Korea, India, Great Britain)
ECM AB (Sweden)
DATRON-TECHNOLOGY (Slovakia, Czech Republic)
Our partners guarantee you worldwide availability.
Feel free to contact us.

CSM GmbH Germany is certified.

ISO 9001, ISO 14001
Certified Integrated Quality and Environmental Management System
www.tuv-sud.com/ms-cert

DAkkS
Deutsche Akkreditierungsstelle
D-K-15214-01-00

All trademarks mentioned are property of their respective owners.
Specifications are subject to change without notice.
CANopen® and CiA® are registered community trademarks of CAN in Automation e.V.
EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Copyright © 2024 CSM Computer-Systeme-Messtechnik GmbH

CSM_UniCAN_Bergische Achsen_UC_01.00
21.03.2024