



Partner for XXL Dump Trucks |
Case Study Mechanical Engineering, Special Machine Construction

Embedded Platform Withstands Harshest Conditions: Eckelmann is a Partner for XXL Dump Trucks

To handle inclines with high speed at altitudes of up to 5,000 meters in large-scale mining operations, fuel-efficient dump trucks impress with a combination of an efficient drive system and a high-performance engine. As a development partner, Eckelmann also impresses with incredible speed, delivering hardware prototypes and firmware packages in just five weeks.

“An exciting task that suits the taste of Eckelmann engineers: When a hardware and software solution for demanding environmental conditions with a lot of horsepower “under the hood” is required and the customer specifies an extremely tight time frame, we excel!”

Dr. Marco Münchhof | Board Member Eckelmann AG



Partner for XXL Dump Trucks | Case Study Mechanical Engineering, Special Machine Construction

Objective

Mega dump trucks in mining meet extremely high requirements. These dump trucks can transport payloads of several hundred tons from mines, so the drive system must be correspondingly powerful, with performances in the range of several thousand horsepower. Eckelmann’s task: The control system should be programmed by the customer to regulate the entire driving cycle, including ABS, differential, and anti-slip control, as well as traction control to prevent the XXL wheels from spinning when starting off.



› Fuel-saving dump trucks with a combination of efficient drive system and high-performance engine for open-cast mining even at 5,000 meters above sea level: Eckelmann delivered the hardware prototype plus firmware package in just five weeks.

Performance by Eckelmann

- › Prototype construction and subsequent series production take place in one location and on the same machines. This allows Eckelmann to create a quick and smooth transition: All adjustments and optimizations made during the prototype phase can be used 1:1 for series production.
- › The control systems must be available throughout the entire product lifecycle of the devices and machines — this can be twenty years or more.
- › Obsolescence management: Eckelmann engineers monitor reports on component changes and discontinuations and take appropriate countermeasures in coordination with customers.
- › In case of supply issues, developers can immediately look for alternatives together with purchasing — this was a real added value, especially during the component crisis of recent years.

Machine/Application

All in all, a task entirely to the taste of the Eckelmann engineers: A cool product with lots of power “under the hood,” a tight time frame, and a unique challenge. The device was developed, the first units were produced, and of course, delivered to the customer on time.

The customer develops the application themselves with CODESYS V3.5, which is available on the device for PLC programming.

Eckelmann takes over permanent support for the Board Support Package (BSP), including updates and security patches for the embedded control. Eckelmann builds its own Linux distribution from the sources. This gives Eckelmann full control over the BSP and allows them to decide which packages to integrate, with insight into the entire software and all drivers. This makes the system very lean and performant. Another important aspect: Packages that do not exist cannot become security vulnerabilities.

Meters	Time to Prototype
5,000 m.a.s.l.	5 Weeks



› Power-saving, efficient components for use under difficult conditions: Eckelmann engineers developed a passive cooling concept for the motor to sustainably reduce the heat dissipation of the device at low air pressure at an altitude of 5,000 meters.

Special Features

- › Eckelmann’s control system had to withstand the toughest operating conditions of the towering trucks: dust and waterproof, operating reliably at temperatures from -40 to +85 °C, and at altitudes of 5,000 meters.
- › To ensure the device’s tightness, the engineers relied on a passive cooling concept from the start of development. The Wiesbaden team also had to consider that at low air pressure at 5,000 meters altitude, the device’s heat dissipation is reduced. Here, Eckelmann used energy-efficient components.
- › Eckelmann keeps its BSP close to the Linux mainline kernel, allowing kernel updates to quickly integrate into the BSP. The speed of implementation plays an important role, especially concerning cybersecurity. The update mechanism includes a fail-safe update process



Do you have any questions?

Maximilian Gottschalk
Key Account Manager Embedded Solutions
Eckelmann AG
E-Mail: m.gottschalk@eckelmann.de



Your Partner for Industrial Automation
& Digitalization

Eckelmann AG | Berliner Straße 161 | 65205 Wiesbaden | Germany | eckelmann.de

Copyright ©2024 Eckelmann - All rights reserved.