



REGAMOTION®
A PART OF REGAL COMPONENTS

Electrification of industrial vehicles

Customer case



Regal

Malwa 560C

Malwa 560 combi machine is a combined harvester and forwarder. The machine is robust, agile and navigate its way forward with minimal footprint. These unique properties enable the machines to be used in sensitive environments close to or in urban areas, where there may be requirements for lower emissions and low noise levels.

Normally, the machine is powered by a 2.8L diesel engine producing 55 kW (75 hp) at 1600 rpm and up to 300 Nm. Two hydraulic pumps are fitted to the diesel engine. One pump provides flow and pressure to the hydrostatic/mechanical transmission, while the other drives the on-board hydraulics, including crane and harvesting head.



Malwa 560C



ELECTRIC TRANSMISSION

The electric version of the 560C is equipped with two electric motors and the transmission completely lacks the hydraulics that are otherwise necessary in the diesel powertrain. Instead of a hydrostat, the electric motor is now directly connected to the mechanical gear, which significantly increases the efficiency of the system.

The motor is of the same type that is used today in most modern electric cars, it is strong from standstill and can work with high efficiency throughout the entire speed range.

ELECTRIFIED HYDRAULICS

The hydraulics are driven by a variable pump with load sensing just like in the regular 560C. It is a well-proven design with good performance and allows the electric 560C to be produced like a regular 560C without other changes to the hydraulics.

The difference in the electric version is that the pump is now driven by an efficient electric motor instead of a diesel engine. The electric motor, which provides full torque even at very low rpm, enables better speed control of the pump. Not spinning the pump faster than necessary is positive for both battery consumption and noise level.

Electrification

Malwa's electric 560C has been developed within a Vinnova-funded project (Sweden's innovation agency) where a concept for a modular battery system for small and medium-sized industrial vehicles is demonstrated. In a few months, the project went from sketch to fully functional machine that had its premier at the Elmia Wood fair in June 2022.

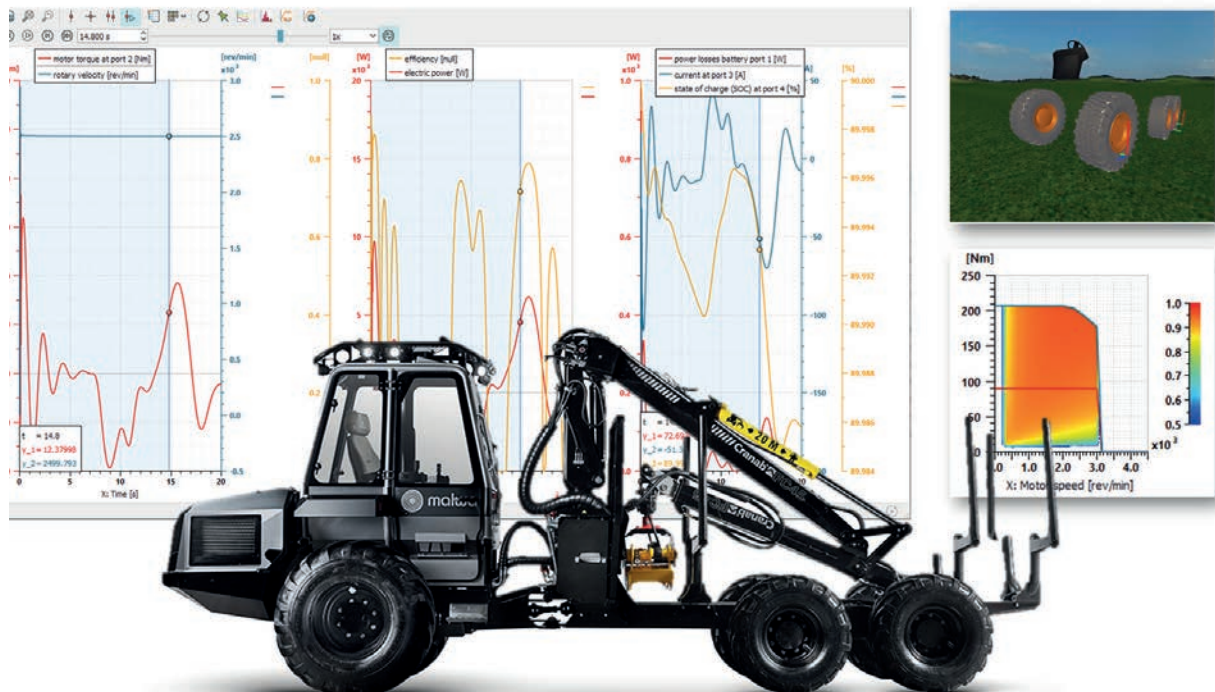
Regamotion has contributed to the project with system development, components and design of electric drive systems in close cooperation with other project members.



Electrification

Since the time frames within the project were tight, we chose to carry out a series of system simulations early on where we could use models of batteries, motor controls and motors to get a good first picture of what requirements would be placed on the future powertrain. The simulation models allowed us to evaluate different intended load cases in advance and gave us confidence in proceeding with the chosen solution.

The new electric powertrain has been developed as a stand-alone subsystem and has been integrated via CAN directly into the machine's existing IQAN system.



CONTROLLERS:

2 PCS ACS8070L

50-104 V_{DC}

700 A_{RMS}

CAN-bus integration

Speed control with drive profile settings

Dynamic control of power and/or torque

MOTORS:

2 PCS GSM312

2x 210 Nm (Up to 2500 rpm)

2x 57 kW @ 2800 rpm

Permanent magnet synchronous AC motors

BATTERIES:

CASSETTE 80V-SYSTEM

33 kWh

30 kW continuously

60 kW peak power

80V EMBEDDED BATTERY

8,5 kWh