

Preliminary information: Electrification of the crawler crane CW25.35

The crawler crane CW25.35 has been equipped in the past years with different diesel engine. According to the emission level regulations these engine were compliant with:

- stage IIIA, current level for non regulated market
- stage IIIB
- stage IV, current level for the US market
- stage V, current level for the EU market (stricter regulation)

Each of this step has required an effort to update the crane for the different technologies and control systems.

Now Marchetti is increasing his efforts to meet the challenges of tomorrow.

In most of the advanced market in the world emission reduction is not enough, and technology must go toward zero emission.

The electrification of the CW25.35 is the solution.

The Hybrid architecture.

What is an hybrid machine for Marchetti ?

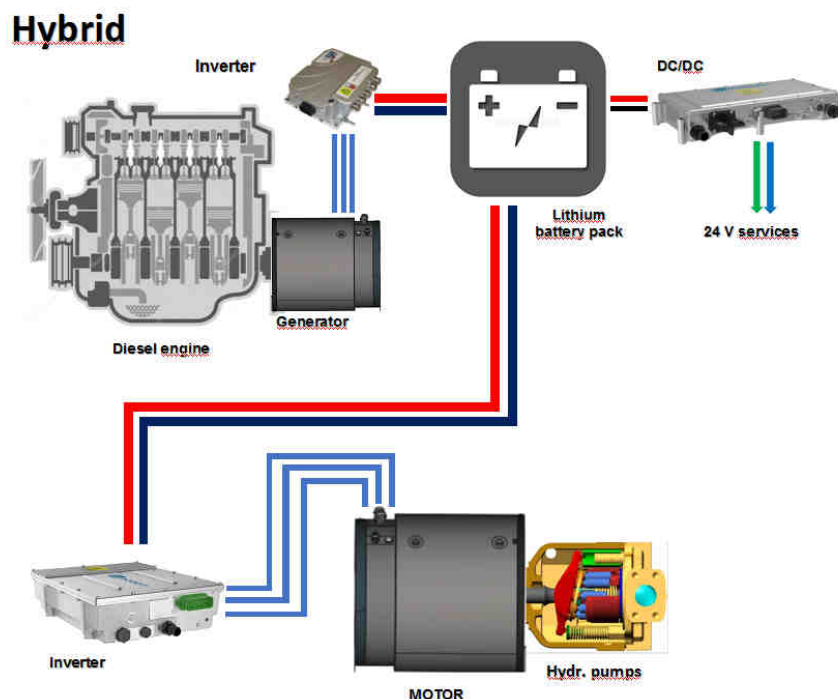
Cranes are construction machines used in a lot of different job sites, but electrical power is not available everywhere. This is the main reason to develop an hybrid machine, which can be used in different ways:

Zero emission: full electric. The crane is powered by a powerful electric motor supplied by the energy stored in the battery. The crane is also equipped with an high power On Board Charger. If an external electrical power is available, the battery can be recharged without switching on the diesel engine: always zero emission.

→ green

Hybrid: a small diesel engine drives a generator which can recharge the battery while the crane is working. In this way the crane is completely independent from external power source. It can work always and everywhere

→ flexibility



The main components:

The battery pack is the heart of the system. 450 Vdc voltage is supplied by many Lithium cells working together. A battery management system (BMS), provides the optimum balancing between each cell, during crane operations and during the recharge. The LiFePO₄ technology ensures safety and a duration of over 4000 cycles. Depending on the load cycle of the crane, the battery pack can provide up to 1 working day autonomy (8 hour).

→ **long life**

The pack is enclosed in a strong steel box, electrically heated.

→ **ready for cold climate.**



The On Board Charger (OBC) can supply 11/22 kW for the battery charge from a standard 3 phase 380Vac 50 Hz 16/32 A.

It is not necessary to connect the crane to a public column or to an external wall mounted charger. In a short time a fast recharge can be performed during lunch break, or a complete recharge during the night.

The OBC is IP67 and is supplied with standard plug connector.

→ **quick**

The electric motor is the arm of the system, providing a peak power of approx 100 kW.

It is a strong permanent magnet synchronous motor, equipped with a specific cooling system.

→ **power**



The inverters convert the direct current supplied to or from the battery in the alternate current used by the rotating electrical machines.

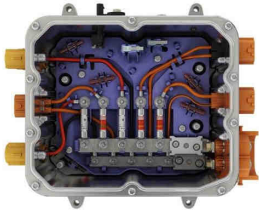
The inverters are advanced electronic devices with control the AC frequency to change motor speed and to control torque.

→ **efficiency**

A diesel engine drive the electric generator, which works as a range extender, offering a power of approx 30 kW. It is useful when external energy is not available. It is small compared to the engine in standard cranes.

→ **less noise, less emissions, less maintenance costs.**





A power distribution unit (PDU) manages the high voltage power distribution. Fuses, harness and connectors are designed for the high currents involved (up to 300 Arms).

→ **safety**

A DC/DC converter supplies the standard 24 Vdc electric system of the crane. Cab conditioning (cooling and heating) is electrical, no need to switch on the engine or a fuel heater.

→ **simple**



The electric pack is managed by a dedicated electronic control unit with a specifically designed software. Every device is monitored continuously.

The crane can be equipped with a remote monitoring system based on 4G network. This can help to monitor the battery status and simplify the maintenance activities.

→ **serviceability**

System integration

Using the CAN bus connecting all the electronic devices, all the relevant parameters are displayed to the operator in the new 10" touch display.

No change in the crane control cab.

→ **easy**

No change in the crane hydraulic system. No change in the undercarriage. All the electric parts are in the superstructure, far from water and mud.

→ **strong and reliable**

