

# Electrifying efficiency

## CURTIS INSTRUMENTS OFFERS A PATH TO SUSTAINABILITY FOR OFF-HIGHWAY

▶ The off-highway machinery industry is undergoing a significant transformation with the advent of electrification. As the world strives toward sustainable and eco-friendly solutions, the off-highway sector is embracing battery electric and hybrid power to meet the demands of efficiency, reduced emissions, and improved performance.

In this context, motor speed controllers, also known as inverters or motor drive units (MDUs), play a crucial role in the electrification of off-highway machinery, offering numerous benefits catering to both environmental concerns and operational capabilities.

### Electrification shift

The off-highway machinery sector relies on diesel engines. Growing environmental concerns, stricter emissions regulations, and the need for more sustainable practices are driving the industry towards electrification.

Electric power generates a myriad of advantages, including decreased emissions, reduced noise levels, lower operating expenses, and improved performance.

### Emissions compliance

The strongest argument for battery-electric machinery can be summed up in two words: emissions regulations. This is especially true in European urban areas, though several environmentally progressive states in the US have joined the call.

Emissions legislation varies by country, state, and municipality. Understanding how to operate within those limits is critical. A company operating equipment that fails to comply with pollution ordinances could be met with steep penalties and fines. Beyond governmental and industry regulations, several OEMs have self-imposed commitments to reach carbon neutrality by 2030.

In response to a demanding market in an ever-evolving regulatory environment, OEMs recognise electrification as the best solution for machines where cost and emission reduction system size make diesel power impractical. Given the broad range of power requirements, a one-size-fits-all electrification solution does not exist. OEMs may require the expertise of an experienced partner.

### Optimal efficiency

The OEM's primary goal in designing battery-electric powered equipment is to maximize



ABOVE: The HVIF5-R, Curtis Instruments' high-voltage motor speed controller

MAIN: Curtis offers system-wide integration of electrification products for both hybrid and full EVs

productivity for a given battery capacity. System efficiency is key, as less of the valuable battery energy is wasted. Motor speed controllers using advanced algorithms are essential to achieve the highest possible efficiency in any correctly optimised drivetrain.

### Superior controllability

Unlike typical diesel machines, battery powered machines utilise multiple electric drives to replace hydraulics with direct electric drive wherever possible – resulting in a significant increase in overall efficiency due to regenerative energy capture. Their sophisticated control systems also provide superior controllability allowing the machine's operators to work more accurately with higher productivity, helping project managers not only meet deadlines, but exceed them.

Electrification leads to lower running costs for off-highway machinery. Recharging batteries with electrical energy from the grid or via local renewable sources such as solar or wind, is far less costly than the fuel required by a diesel-powered machine. Electric drivetrains also have few moving

parts – with no filters, oil, or other consumables to change, service costs are significantly reduced. The lower fuel and servicing costs can therefore give an electrified machine a much lower total cost of ownership (TCO) than the equivalent diesel machine.

Electric equipment is inherently compliant with noise ordinances. In urban areas, the productivity gains are quantifiable. Projects that were previously limited to specific hours of the day due to excessive noise can begin earlier – and with more work hours, they'll likely be completed sooner. Additionally, indoor and underground projects are far less hazardous with zero exhaust fumes and lower operating noise levels.

The challenge for manufacturers considering off-highway equipment electrification is how to comply with regulations while meeting their own goals and deliverables. Partner with a company that both intimately understands the regulatory environment and is recognized as a worldwide leader in the electrification industry. The result? Superior performance and long-lasting benefits – for the company, clients, and the environment. **ivT**



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