

Danfoss wheel loader solutions

Performance. Uplifted.

Integrating transmission, steering, work function and thermal management solutions for one powerful machine.

Wheel loader industry challenges

When it comes to wheel loaders, OEMs face multiple challenges. These can include optimizing vehicle performance, time-to-market and gaining market share within an extremely diverse global customer network.

Looking at today's wheel loader landscape, there are four main challenges to achieving higher profitability: increasing productivity, resolving the availability problem for experienced labor, managing the energy transition and meeting diverse market expectations.

1 Increasing productivity

Successful OEMs identify and execute solutions that provide advantages in the all-important "output cost/input cost" ratio, whether that be reducing machine costs, maintenance or fuel consumption.

2 Inexperienced workforce

The workforce as we know it has changed. In the past — think 1940s through the 1960s — it was common for young workers with experience driving agricultural equipment to find operating jobs on the worksite that led to extended employment. An intrinsic knowledge of machinery and efficient work was common within the labor force. Today, however, that basic footprint of labor is either not present or not intrigued by the opportunities associated with a construction equipment operator career path.



MAIN CHALLENGES

Because of this, fleet managers and construction companies struggle to find career equipment operators. The pool of willing and experienced employees is dwindling, particularly in Europe and North America.

3 The energy transition toward zero emissions

The volatility of the energy market makes overall wheel loader efficiency even more important. Utilizing energy sources and conversion methods, and weighing options like an internal combustion engine vs. hybrid vs. electric (battery only) are new challenges OEMs must navigate to succeed. The influence of disruptive technologies and regulatory decisions adds to the complexity in a competitive marketplace.

4 One company, varied markets

For global manufacturers, the expectations of machine performance may differ greatly, depending on which region of the world their machines are being sold. Varying factors can include emissions compliance, operator comfort requirements or vehicle productivity, among others.

For example, China tends to emphasize machine function with operator comfort typically considered much less important, particularly relative to North American or European markets. A resulting challenge for OEMs is supporting the various market needs with minimum overall complexity for the design and fulfillment of their wheel loader platforms.



Streamlining operations and simplifying a wheel loader design will **increase productivity, improve safety, boost performance** and **shorten time-to-market** — ultimately leading to improved profitability.

True Optimization

— looking beyond the subsystem

When it comes to wheel loader design, four main subsystems work together:

- Transmission system
- Work functions system
- Steering system
- Thermal management system

And while it's easy to think of them as independent of one another, doing so contributes to significant problems for the final customer, machine owner or operator.

► Allocating power

For example, consider a wheel loader that uses a torque converter power shift transmission system. When treating the ground drive and work circuit as separate items on the wheel loader, the typical sizing process would involve allocating a discrete amount of engine torque to each function. This way, the sizing of the machine always assumes both of those functions — the work hydraulics and ground drive — are active at the same time to avoid stalling the engine and achieving required tractive effort.

For this classic sizing method, the problem occurs when the machine is utilizing a small portion of the ground drive or work function hydraulics — meaning there's a certain amount of installed engine power that isn't needed. This leads to oversized engines, increased engine speed and higher parasitic losses — increasing the initial cost of production, reducing production efficiency and increasing operating costs.

Consider the shoulder — a 65 percent difference in muscle activity can significantly reduce repetitive motion, positively impacting operator wellness for years to come.

With these findings, OEMs can integrate new steering solutions into their machines, knowing they can improve operator comfort and increase productivity.

Performance. **Uplifted.**

New technologies and capabilities can significantly enhance wheel loader operability, comfort, productivity and safety — all while helping OEMs address their most pressing market challenges.

► **A partner to make it happen**

And while all of this sounds great, it begs the question — “Why isn’t everyone doing this?” Machine level technologies are being integrated, and software capabilities are still being implemented the off-highway industry, and OEMs are still working through how to best implement it into their machine/vehicle portfolio offering.

Yet, to be on the cutting edge of machine performance and technologies, working with a skilled partner can make the move an easier process.

Danfoss offers a wide range of product, system and design solutions specifically engineered for wheel loaders. This includes its vehicle management technology called Best Point Control (BPC), which facilitates machine networking to where it’s established optimal operating conditions. In addition, Danfoss hydrostatic drive solutions and control architectures also enable machine management. Lastly, Danfoss offers a wide range of solutions, including anti-stall functionalities and electronic torque limiting (ETL) logic for our work circuit.

At its core, Danfoss can supply the building blocks for a machine management network and architecture. Beyond that, it’s able to offer its expertise on how to make it work for your specific wheel loader needs.



About Danfoss Power Solutions

Danfoss Power Solutions is a global manufacturer and supplier of high-quality hydraulic and electric components. We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market as well as the marine sector. Building on our extensive applications expertise, we work closely with you to ensure exceptional performance for a broad range of applications. We help you and other customers around the world speed up system development, reduce costs and bring vehicles and vessels to market faster.

We offer you expert worldwide support for ensuring the best possible solutions for outstanding performance. And with an extensive network of Global Service Partners, we also provide you with comprehensive global service for all of our components.

Danfoss Power Solutions – your strongest partner in mobile hydraulics and mobile electrification.

Products we offer:

- DCV directional control valves
- Electric converters
- Electric machines
- Electric motors
- Hydrostatic motors
- Hydrostatic pumps
- Orbital motors
- PLUS+1® controllers
- PLUS+1® displays
- PLUS+1® joysticks and pedals
- PLUS+1® operator interfaces
- PLUS+1® sensors
- PLUS+1® software services, support and training
- PLUS+1® software
- Position controls and sensors
- PVG proportional valves
- Steering components and systems
- Telematics

Go to www.danfoss.com for further product information.

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