

Take the rough with the smooth

WE GET UNDER THE SKIN OF TWO OF KALMAR'S LATEST MACHINES – ONE ORIGINALLY DESIGNED TO HANDLE THE HARSHTEST CANADIAN TERRAIN, AND THE OTHER TACKLING SLIGHTLY EASIER CONDITIONS – BUT BOTH WITH ENHANCED COMFORT, FUEL EFFICIENCY AND HYDRAULIC OPERATION

MAIN IMAGE: Available in seven capacities, the DCG180-330 forklift is ideal for a variety of heavy-duty applications. Pictured here is the 22 metric ton version

BELOW: The BigWheel was originally designed to enhance timber transporting, especially during the tough conditions of a Canadian spring

 Kalmar Forklift Trucks has recently launched two robust machines for tough environments. Regarding the first, the DCG140-6 (dubbed the BigWheel) Johan Hellström, product manager at Kalmar Forklift Trucks, explains, "It stemmed from a request from a sawmill in British Columbia, Canada. They needed a solution to tackle the rough ground – in particular, mud and uneven terrain – especially during springtime due to all the melting snow, so they asked for a forklift with higher ground clearance and improved traction to cope with the conditions."

The solution has several unusual features to adapt it to the challenging environment, including large 23.5in R25 Yokohama front tires, a ground clearance of 400mm under the mast, 300mm under the counterweight at the rear, and 550mm under the belly of the machine. It also features a retuned Cummins engine with a reduced top speed but improved torque for greater traction.

Hellström continues, "We wanted to use as much as possible from our existing G-generation platform to retain some parts harmonization and offer the same benefits as with the G-generation trucks. However, we went with a 300mm wider stance than normal to increase the stability."

"Also, those front tires are crucial in the design – they really do form part of the suspension, soaking up the bumps to make a more comfortable environment for the driver."

Common sense

Powering the two drive wheels via a Kessler front axle is a 129kW/172hp Cummins QSB6.7, in common with Kalmar's DCG90-180 medium forklift range. It is equipped with Stage IIIA or Stage IV emissions kit and features Danfoss electronics.

Also common to both designs is the hydrodynamic ZF Powershift transmission, although its gear ratios have been lowered to compensate for the larger tires. A differential lock is optional.



The design was created in CATIA V5, and two physical prototypes were built. The process was quick, lasting less than a year, despite the thorough testing that took place.

“We effectively did the design in two stages, to take account of any feedback from the customer,” Hellström elaborates. “First we did a full performance test according to Kalmar’s standard specification at our Lidhult [Sweden] factory before delivery to the field tests. These took place at several sawmills in British Columbia, during both winter and summer conditions. However, as the machines were working out in the wilderness, we had to be patient in waiting for news.

“After the field tests, some minor updates were made to the design to adapt the truck to local conditions, but thankfully all the main systems such as the hydraulics, electronics, engine and transmission worked flawlessly. We only had to make some very minor adjustments, for example to the mudguards.”

Cab design

One area in which Kalmar has made great strides over the last decade or so is with the operator compartment, culminating with the launch in 2011 of the Ego cab. Designed by Kalmar’s team in Lidhult, the process started by taking an existing Spirit Delta cabin and chopping it in half to see where improvements could be made.

Everything was considered, and the company even went to the extent of sending its development department to a course on cognitive ergonomics at Chalmers University of Technology in Gothenburg. Several innovative solutions were created, including a patented windscreen wiper design, with the motor attached to the rear of the roof.

A variety of handling options are offered, mostly to do with the stacking and unloading of sawed and packed wood, and Hellström confirms that bespoke systems can be designed if an off-the-shelf solution is not readily available. He adds, “Most BigWheels have gone to sawmills and the wood industry in general, but now other industries are expressing an interest, in particular wind power, the military and the oil and gas markets.”



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THE WAY FORWARD

Kalmar has been making forklifts for use in the timber industry since 1949. Looking to the future, Johan Hellström, product manager, Kalmar Forklift Trucks, says, “I predict that we will see more in the way of safety features, including more automatic functions. Also, given the way the market is going, there will be a greater focus from customers on lifetime cost instead of just the up-front price tag.”

In terms of future motive power, Hellström sees more and more reliance on electric and hybrid machines to keep up with legislation. “We keep our emissions as low as possible with good engine design, but there is a limit to what can be done using diesel alone, although I don’t doubt that generally components will decrease in size. Hydrogen trucks will become increasingly common, and as battery technology improves we will see more and more electric trucks, both indoors and out. Hybrids will also be more popular.

“Another important aspect is the growth of automation, which will increase safety and reduce running costs. Self-driving forklifts are definitely a big part of the future, particularly where the driving cycle is pre-defined and the loads consistent.”



MAIN IMAGE: Larger-than-usual (23.5in) tires on the Kessler drive axle act like suspension to enhance operator comfort

ABOVE: Sawmills are the main customers for the BigWheel, but its appeal is growing to other industries and markets



Weighting room

Also new this year from Kalmar is the DCG180-330 heavy forklift. Designed for very heavy-duty applications in the 18-33 metric ton zone, such as those found in the manufacturing and steel industries, it is so new that the OEM is not even able to confirm how long development took or who is currently testing it due to some strict confidentiality agreements.

Hellström describes one of the main design challenges: “When handling such heavy weights, the important thing to get right is to have tires and axles capable of withstanding the extreme loads. Another part of the machine that is affected by heavy loads is, of course, the mast. We have strict quality tests for the lifting equipment before the truck is allowed to leave the factory. Quality and durability has long been a cornerstone in the development of Kalmar forklifts.”

Ultimately, the OEM plumped for a Kessler/Axletech combination, coupling it with a Dana TE 32000 transmission. For motive power, two brands are offered, both compliant with Stage IV/ EPA Tier 4 Final, although engines in Stage IIIA trim can also be supplied if required.

Two flavors of Cummins QSB6.7 engines are available, offering either 168kW (225hp) or 194kW (260hp). Alternatively customers can select Volvo Penta’s TAD871, which is rated at 185kW (252hp).

Hellström observes, “Awareness of a machine’s total cost over time is something that has increased over the years. Fuel efficiency is now one of the most important characteristics for the European market due to the high fuel cost.”

With this in mind, the DCG180-330 has three drive settings: Power, Normal and Economy. The first, as the name suggests, is used when the weight being moved is at the top of

the range, bringing out optimum performance to increase the number of tons per hour shifted. The second category blends power and economy to boost profitability, while Economy is for when the total cost of operations outweighs the need for performance.

Hellström notes, “Purchase price is only one of many factors affecting total cost of ownership. In fact, it is a minor cost factor looking over the lifetime of the forklift. What truly

LEFT: The DCG180-330 offers improved operational capabilities, especially concerning fine maneuvering, side-shift and fork positioning. The lowering speed has also been increased

BELOW: At 300mm lower, the carriage of the DCG180-250 models further improves visibility in the forward direction



CASE STUDY



RIGHT: **Massaging the Ego** – operators will feel pampered in the enhanced cab used on both trucks

BELOW: The infinitely adjustable display screen ensures the driver is made immediately aware of any error codes

CENTRE: The vertical wiper provides over 90% drying surface on the curved windscreen

BOTTOM: Visibility is enhanced in all directions



matters in the long run is cost control and operational efficiency – that will show clearly on an owner's bottom line. In comparison with our previous model, the DCG180-330 uses up to 15% less fuel in standard configuration."

By selecting the optional Eco mode, Hellström reckons operators can save an additional 15%. Crafted in-house by its software engineering department, the new control system has several parameters carefully optimized, such as RPM, vehicle speed and torque, reducing the impact of driver fault behaviors.

And that's not the only fuel-saving element of the new design. Hellström continues, "Another new feature on this model is the optional electronic overload protection, which stops the hydraulic functions or reduces the vehicle's speed if it is overloaded. It adapts the hydraulic flow depending on the current load, which improves fuel efficiency and generally lowers the noise and wear of the hydraulic system."

To manage all of this new technology, Kalmar – along with partner Danfoss – has created a new electrical diagnostic system. Should it detect a fault, it automatically displays an error code on the operator's display, so instant action can be taken instead of spending time on troubleshooting. And in the event of a service technician needing to be called in, repairs will be faster and downtime shorter because the technician can source any relevant

spares well in advance based on the diagnostic data.

Another important design enhancement between this and the outgoing DCF model it replaces lies in the hydraulics, where a variable load-sensing pump now checks every single operation and adjusts the oil flow accordingly. This has resulted in a 40% faster lift cycle, and also aids fuel economy.

Cabin class

The DCG180-330 is equipped with the new Ego cab. Its curved front and rear windows are designed to offer good visibility at all angles, particularly diagonally, and the profiled beams eliminate blind spots. Hellström elaborates, "The whole interior has been designed with the driver in mind. More or less everything is adjustable to fit all kind of drivers. For example the steering wheel can be adjusted in every possible direction; it can even be tilted sideways."

Operators will also notice a fully integrated rotatable seat, while an overhead guard is also available for hot or indoor operations. More details and images of the Ego cab can be found on page ??.

Kalmar has set out its stall by singling out lifetime running costs and operator comfort as key features of both of these new big trucks, whatever the difference in their application. No doubt this logic will stack up, ensuring the OEM can reach out to customers old and new. **ALT**