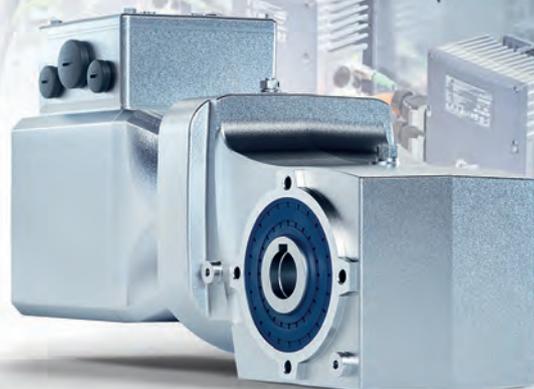




NORD DRIVESYSTEMS ERPROBT ANTRIEBE IM TESTFELD

Einfach zwei Klassen besser:
 IE5+ Motoren im Effizienzvergleich



SPECIAL REPRINT
 Translated from the German

LITHIUM-ION TECHNOLOGY OPTIMISES WORK ASSIST VEHICLE FROM CROWN

UPDATE WITH CONVINCING PERFORMANCE



Crown has retrofitted its proven WAV 60 multifunctional vehicle with lithium-ion technology. The aim of the measure is to further improve driving and handling comfort and to increase productivity. We tested the predecessor model, the variant with lead-acid battery and AC power, back in 2017 in the May issue. Read in the test what effects the update with lithium-ion technology has on the performance of the “Work-Assist-Vehicle”, in short Wave.

The Wave is a combination between a mini aerial work platform and a high-lift order picking truck. It is best compared to a mobile ladder, but is superior in terms of safety and handling. The liftable platform can be extended to a height of 2,995 mm, which brings the maximum reach height to just under 5 metres.

The model has been on the market since 1997 and has been regularly developed further since then. In the latest update in 2017, the manufacturer replaced DC technology with AC technology, plastic parts made way for robust steel components and the travel and lifting speeds were increased.

01 The engine compartment of our test candidate houses a lithium-ion battery and an integrated charger

02 Alternating actuation of the platform sensors with the feet activates the Wave

03 The right hand controls the direction of travel and the speed. The left handle is equipped with a horizontal toggle switch for steering



01



02

NEW FEATURES

The key innovation that makes the 2022 model interesting is the „V-Force“ lithium-ion energy storage system. The current WAV 60 is optionally available with only one 24 V/105 Ah lithium-ion battery, which can be charged at any conventional 230 V socket via the integrated 50 A charger. If required, the vehicle can also be equipped with two lithium-ion batteries. In this case, the integrated charger has to make way for the additional energy storage unit. For the double battery version, one of the new external „V-Force“ 24 V chargers with 50, 150 or 300 A is used for charging.

Also new is the additional safety function of the self-locking gates. The Wave allows the highest driving speed as soon as the platform is lowered and the gates are open. This may sound contradictory, but Crown explains it is not, because it's safer to get quickly off the truck through the open gates in case of emergency than to create an additional obstacle with the closed gates. However, with the gates open you cannot lift higher than 500 mm. If the lifting platform is extended further, the gates must remain closed, they are automatically locked and the speed is reduced.

LEARNING CURVE OPERATION

We take a closer look at the 2022 model of the WAV 60. Our test candidate offers plenty of practical storage space in the operator platform area. There are compartments and storage options, e. g. for stowing the charging cable. An integrated retractable charging cable was not installed in the test truck, but it's available as an option. The charging cable is connected via the fold-out front panel. External platform lift control is also possible via this console.

The typical Crown design has been retained for the current Wave, and that is a good thing. Even after 25 years, the design has lost none of its modernity and appeal. Also unchanged are the driving and steering functions. Anyone riding the Wave for the first time will have to get used to it. The right handle is used to turn and control the direction of travel and speed. The left hand is for steering. For this purpose, the left handle is equipped with a horizontal toggle switch. Pressing to the right or left steers the truck in the corresponding direction. You steer with the driven rear wheels, the wheels at the front of the vehicle turn smoothly in the right direction. Push buttons raise and lower the work platform.

TRAVEL MODES AND SAFETY STANDARDS

Crown has equipped the Wave 60 with three travel modes: P1, P2 and P3. The latter is very restrained and seems to us to be best suited for inexperienced operators. In the P1 setting, we reach the highest speed. Until you get used to the mobility of the industrial truck, P2 mode is a suitable alternative.

In terms of control and safety, attention and a willingness to learn are required. The floor of the work platform has two marked areas that house sensors. These must be activated by alternately stepping on them with both feet before starting. Before you can start working after this procedure, both hands must be on the handles. Light sensors monitor this, but they are very sensitive. Occasionally,





04



05

04 At the front, there is a foldable console with fittings for charging the battery and for external control of the lifting functions.

05 If two lithium-ion batteries are on board, the external, powerful „V Force“ chargers are used

we have to reposition the hands to reactivate the truck functions which have been temporarily switched off. The same applies to the placement of the button for selecting between rabbit and turtle speed. Sometimes, we unintentionally shifted it with our left hand, and were surprised that the Wave suddenly slowed down the drive.

THE LITHIUM-ION EFFECT

When you have the Wave 60 well in hand, the vehicle works pleasantly, quietly, and smoothly. Depending on the working height, you close the safety gates or keep them open to be able to drive faster. With the safety gates closed, we reach a maximum driving speed of 5 km/h. If we extend the platform further, the speed is reduced. With the safety barrier open, we measure a driving speed of 8.4 km/h. Compared to the previous model, the driving speeds remained almost the same, but we measured significantly better values for the sprint speeds. Whether gates are open or closed, the Wave 60 now reacts much faster. It is an effect that we have seen in many other industrial trucks that have been converted from conventional lead-acid battery to lithium-ion technology. The increase in performance is also apparent in the measured lifting speeds of the platform.

HIGHER PRODUCTIVITY, LOWER ENERGY CONSUMPTION

Adding up all the positive changes, compared to the predecessor model, we achieved on our test track 16.1 per cent more picks per hour in mode P1, 17.6 per cent more in mode P2 and 10.6 per cent more in mode P3. The energy consumption for 1,000 picks is reduced by 29, 25 and 31 per cent. The practical operating time

with a lithium-ion battery on board is thus about 7.5 hours. For intensive use, the lithium-ion battery can be easily opportunity charged via the integrated 50 A charger. We tested the charging process during two breaks of a good quarter of an hour and just under half an hour. The integrated charger fills the battery by about one percent per minute. The emptier the battery, the faster the charging. With the stronger external 150 A and 300 A chargers, charging is 3 to 6 times faster. With two lithium-ion batteries on board, even the most demanding daily operation can be done without intermediate charging.

CONCLUSION

With this update, Crown brings an improved version of its Wave 60 to the market. The lithium-ion batteries give the truck more power and responsiveness. This makes the faster and more efficient, resulting in a noticeable increase in performance. The “V-Force” lithium-ion technology also offers the choice of fast charging with an external charger or conveniently with the built-in 230 V charger. The design of the Wave 60 is still up to date and has become even more practical thanks to the revised storage compartments. The high American safety standards require a certain routine in handling, but once you have internalised the operating concept, the current Wave 60 is a practical combination of mini lift and order picking truck.

Text and photos: Andersom Testing, Theo Egberts and Mark Dohmen

VALUATION

- + Productivity
- + Energy Consumption
- + Design
- Operating learning curve
- Sensitivity of safety systems