Bell Motor Grader set to revolutionise the mining and construction industries

Global manufacturer and innovation pioneer, Bell Equipment, has expanded its design and manufacturing expertise to include motor graders and is busy with the final testing and refinement of a new product range with production set to begin late 2024, early 2025.

The Bell Motor Grader follows the introduction of the Bell Tracked Carrier in 2020 and is a significant step forward in the company's strategy to strengthen its position as a leader in the yellow equipment industry by diversifying its product offering and reducing reliance on its core product, the Bell Articulated Dump Truck (ADT).

Bell Equipment Product Manager, Warren Swart, said: "We've seen a progressive evolution towards more robust and powerful graders and Bell is confident that our new Bell Motor Graders will fully meet the requirements of road maintenance, construction and mining applications."

According to Warren, Bell will initially offer three base machines. The G140 is the smallest motor grader and is well suited to all maintenance and light construction tasks while the G160, with its increased power and performance, is more suited to heavy construction. Completing the range is the G200, which is designed as an entry-level machine for the mining industry and to handle extremely demanding construction applications.

Each base machine has the option of a four- or six-wheel drive configuration. Warren explains: "As more operators become familiar with the additional capabilities and performance of six-wheel drive graders, we are seeing clear growth in the demand.

Therefore, we have designed each grader from conception to fully accommodate six-wheel drive components, which has resulted in a more dynamic machine capable of producing the highest quality grade in a reduced number of passes. Importantly, this early integration has resulted in a machine that is reliable and easily maintained."

Though familiar in appearance and operation, the components have been evolved to provide additional features that improve the capabilities and performance of the grader.

By automating some of the complexity, the operator is free to focus entirely on the grading process. Through this automation, the driveline components can be controlled precisely to provide the required power while greatly improving the fuel efficiency. In addition, control of the front hydraulic motors of the six-wheel drive graders can be automated to engage and disengage the front hydraulic motors to enhance the grading quality and protection of components.

Recognising the diverse range of applications and often remote uses of motor graders, Bell has standardised on low maintenance components, such as their 'precision circle' in the pursuit of providing the best consistent performance with extended servicing intervals. Simplifying operations, advanced technological diagnostics have been incorporated into the machine to reduce the complexity of daily checks and servicing efforts.

Design process

The Bell Motor Grader has been engineered to operate in the most challenging and harsh environmental conditions.

Factoring in over two decades of experience with supply, maintenance, and repair of motor graders along with insights from expert advisors has resulted in the realisation of a grader that can operate well in diverse and challenging applications. Focus has been placed on consistent performance.

"Slight alterations in machine length, dampening coefficients, response rates etc. can easily result in an instable machine where obtaining a highly precise finished grade could be near to impossible," explains Warren. "During testing, we've seen precise grading being done on various terrain types with minimal effort from the operators. This stands as a testimony of getting this fine balance right."

Safety has received a keen focus in the design process. The ROPS/FOPS certified cab is designed to provide the best visibility of both the blade and front wheels. The design of the rear chassis does not interfere with the line of sight to the rear wheels and ripper ends thereby enhancing visibility while reversing.

This is complemented with a reverse camera and mirror. Designed to operate in high ambient and dusty environments, the cab is equipped with a powerful air conditioner and optional air cleaner to ensure an ergonomic and clean environment for the operator. "Maintenance has been incorporated into every aspect of the design by leveraging the insights of a number of plant managers and directors as well as analysing our extensive historical maintenance and repair logs," continues Warren.

With the use of low maintenance and easy to adjust components, consistent performance is easily set and preserved with little to no effort. Standard readily available parts have been selected for the wearable grading and ripping components to ensure these components are easily sourced.

Extensive testing

The prototypes have been operating in a wide variety of applications from landscaping to road construction and maintenance with great success. "With the construction of new gravel roads in remote locations, the Bell Grader has had to deal with a wide range of demands from the harsh environment, such as objects like tree roots and boulders that are almost immovable.

The Bell Grader has been able to deal with these obstacles. The blade, with its slip clutch and blade dampening accumulators, has emerged unscathed from these unforeseen impacts.

The ripper has further proven its rigidity with the ability to dig up these boulders and roots without needing additional equipment. These tests deviate from standard operation; however, we wanted the testing to fully encapsulate potential abuse cases."

The use of various tests has been instrumental in ensuring all designs achieve the performance and longevity specified. The use of strain gauges has been exhaustive but essential analysing each area of the motor grader to confirm the longevity studies performed with Finite Element Analysis (FEA) simulations."

With a wide range of uses for graders, several skilled operators tested the Bell Grader. All these operators have been able to operate the graders with little to no training. Additionally, they have been able to perform the same quality of grading in their specific applications, with ease. After testing one of the G140 prototypes, an operator stated in surprise that: "Even with a blade full of material, the machine is still capable of accelerating without struggling. I just need to put my foot down and the machine moves."

Concludes Warren: "Although the Bell Grader is still within its final developmental phase, advancements have already been seen within the safety, performance, efficiency, durability, and functionality making Bell Motor Graders a game-changer. The best is yet to come."