

FX850V-EFI – High-output Riding Mower Engine



In the U.S. commercial mowing market, the demand for engines equipped with an electronic control fuel injection system, which enables high and stable output, from working machine manufacturers is increasing. To meet the market's needs, we developed an EFI model, the FX850V-EFI, using the engine block of the existing carburetor model, which has earned a high reputation in the market. This model has improved maximum service output and a feeling of power in actual work thanks to the electronic governor control.

We have already begun mass-production of this model and put it on the market as riding mowers for several working machine manufacturers.

Introduction

In the U.S. commercial mowing market (for professionals), the demand for engines equipped with EFI (Electronic Fuel Injection), which enables high and stable output, from work machine manufacturers is increasing.

In addition, competing engine manufacturers are enhancing their EFI model lineup for this market, and market demand is expected to increase further.

1 Background of establishing

Kawasaki's FX series riding mower engines have a share of over 50% in the U.S. commercial mowing market, and market research has revealed that this series earned such a high reputation for its quality and durability.

However, when releasing an EFI model in this market, we needed to promptly arrange a more competitive lineup to maintain and increase the market share. Establishing basic technologies for the new EFI system for this model and achieving a high reputation in the market is a key factor to expanding the sales of Kawasaki's EFI engines in the future.

Therefore, giving the highest priority to releasing EFI models as a series as early as possible, we developed the FX850V-EFI based on the engine block of the existing FX850V carburetor model and adopting a new EFI system that had previously been developed for another model.

2 Specifications

Table 1 compares the major specifications of the FX850V-EFI and the FX850V carburetor model. Because these models use the same engine block, they have the same displacement, but the FX850V-EFI has increased maximum service output thanks to its electronic governor control. Electronic governor control uses an ECU (Electronic Control Unit) to process sensor information, such as temperature, intake air pressure, and throttle angle, to automatically control the throttle opening with a motor, mainly according to the engine speed and load.

3 Features

The FX850V-EFI has improved maximum service output, feeling of power in actual work, and cold startability with the EFI and is equipped with additional functions, including a function to facilitate engine inspection.

(1) Improved maximum service output

As shown in **Fig. 1**, the electronic governor control has provided higher maximum service output than conventional governor control.

(2) Improved feeling of power in actual work

The engine speed does not change even if the load

Table 1 Major specifications of FX850V-EFI and FX850V

Item	FX850V-EFI	FX850V
Engine type	Air-cooled vertical V-twin OHV	
Displacement (cm ³)	852	852
Bore × Stroke (mm)	84.5 × 76	84.5 × 76
Maximum service output (kW)	20.2/3, 600min ⁻¹	18.2/3, 200min ⁻¹
Maximum torque (N·m)	63.2/2, 400min ⁻¹	61.3/2, 400min ⁻¹
Total length × Width × Total height (mm)	516 × 503 × 620	488 × 465 × 626
Dry mass (kg)	59.7	56.4

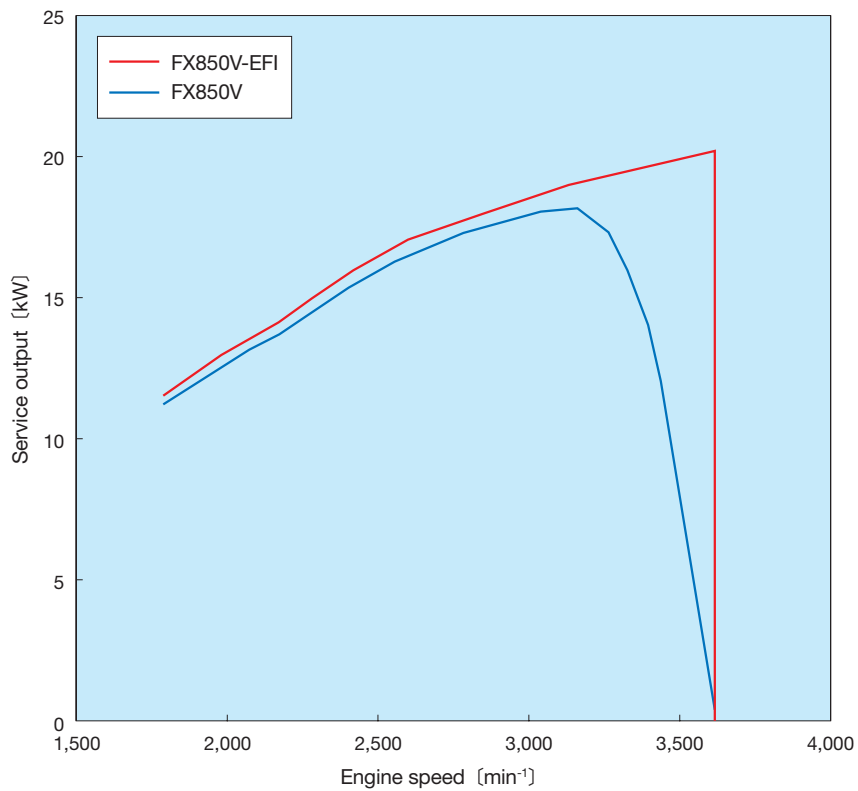


Fig. 1 Performance curves of FX850V-EFI and FX850V

changes as shown in **Fig. 1**, achieving an improved feeling of power in actual work.

The FX850V-EFI can even handle lawns that require such a high load that the FX850V's engine speed (i.e., blade speed) would drop, but without the engine speed falling at all. This means that the FX850V-EFI can mow lawns more evenly for a better appearance.

(3) Cold startability

Information from the temperature sensor installed on the engine is input to the ECU to automatically increase the fuel injection quantity when starting the engine, thereby achieving a smooth engine start without having to use the choke even at low temperatures (as low as -29°C).

(4) Communication with the work machine and the self-diagnosis function

To make communication with the engine easier when electronic control is adopted for work machines in the future, we have adopted an ECU that can communicate

via CAN (Controller Area Network) ahead of the competitors.

In addition, this ECU is equipped with a self-diagnosis function with which failure diagnosis can easily be performed even at dealers by connecting it to a computer with a dedicated diagnosis tool.

(5) Engine protection function

The FX850V-EFI is equipped with a protection function to automatically decrease the engine speed when overheating or low oil pressure is detected, thereby preventing serious failures, such as engine seizure.

4 Delivery

In April 2017, we began mass-production of this model for the U.S. market at the KMM/Maryville factory and have already put this model on the market as a ZTR (Zero Turn Radius) mower of several work machine manufacturers as shown in **Fig. 2**. ZTR refers to a riding mower that is



Fig. 2 Riding mower mounted with FX850V-EFI (ZTR)



Fig. 3 FT730V-EFI

steered by using the rotational speed difference between the rear wheels, and causing the right and left wheels to rotate in opposite directions to turn in place.

5 Enhancing the EFI model lineup

In addition to this model, we have been developing other EFI models to increase our share in the commercial market, and are offering a competitive lineup, including FX730V-EFI and FT730V-EFI (Fig. 3), which have a slightly

smaller displacement of 726 cm³.

Conclusion

We are confident that our general-purpose engines will maintain their high reputation in the mowing market if we are able to develop high-performance, high-quality engines that meet work machine manufacturers' needs and market needs.

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