

Tractor technology can save fuel

ONE perk of ag technology is all the bells and whistles, but they aren't just for show. Guidance systems and other precision ag tools can help you minimize fuel consumption by reducing overlap. Likewise, late-model tractors with infinitely or continuously variable transmissions can be more fuel-efficient than fixed-gear transmissions when cou-



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pled with a load sensor.

Guidance systems reduce overlap, es-

pecially during spring field operations, which results in less fuel consumption, fewer passes across the field and fewer operator hours, says Matt Darr, assistant professor in ag and biosystems engineering at Iowa State University.

With a little planning, ag technology may also improve the efficiency of older tractors. If your equipment is already paid

for, consider precision ag tools that can be paired with existing machinery. Review hydraulic and electrical requirements, or talk to a dealer about matching new technology with different types of equipment.

With or without precision ag, spring field operations require plenty of horsepower. Large tractors must transfer power from the engine to the drive wheels through the transmission, says Mark Hanna, ISU Extension ag engineer. During this process, speed and torque from the engine crankshaft are converted to drive axle speed and torque. A continuously variable transmission, or CVT, can automatically select the most efficient gear and throttle setting according to the drawbar load requirements and the traveling speed.

Newer vs. older tractors

It may be hard for older tractors to compete with the fuel efficiency of a CVT; therefore, shifting up and throttling back is essential when operating an older tractor with a fixed-gear transmission. Shifting to a higher gear and reducing the throttle setting allows you to conserve fuel for jobs requiring reduced engine loads.

During spring fieldwork, a tractor is often only partially loaded for the amount of drawbar power available. "Drawbar tractor operations such as chisel plowing, planting and spraying require different amounts of drawbar force depending on the size of the implement and soil conditions," says Hanna.

Consider a light drawbar load. According to the OEDC/Tractor Test Lab at the University of Nebraska, a Case IH Magnum 245 pulling at 50% of drawbar power consumes 10 gallons per hour in seventh gear at 2,150 engine rpm. Fuel consumption is reduced to 7.9 gallons per hour using ninth gear and a lower throttle setting of 1,620 rpm. That's fuel savings of 20%!

Shifting up and throttling back with heavier loads can also save fuel, though savings are typically closer to 10%. For partial load operations, the key is not to shift too high or reduce the throttle too much. "A significant increase in black smoke or the sound of the engine lugging down are both indicators to shift back down a gear and increase engine speed slightly," says Hanna.

Shift up, throttle back

The "shift up, throttle back" technique is applicable whenever potential tractor drawbar power significantly exceeds the power needed for implement operation. "A classic example is a tractor with a pull-behind sprayer using a hydraulic-drive pump," says Hanna. Similarly, using a small field cultivator or disk for secondary tillage with a larger tractor results in a mismatch of load vs. horsepower — and an opportunity to improve fuel savings. However, the practice is not suited to PTO operations. "PTO shaft speed is directly related to engine speed," says Hanna. "Engine speed must be maintained at a level to produce standard PTO speed, so tractor engine speed can't be reduced."

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Petersen is program coordinator for ISU Farm Energy.

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