

Think ahead for best tractor choice



James de Haviland examines your options when choosing a new tractor – a hugely important long-term decision for the future of your course

When it comes to buying a new tractor it may be tempting to simply consider a model that essentially does what the outgoing machine did. A bit more power, greater linkage lift, better hydraulic flow and larger wheels and tyres perhaps but still a similar class of machine. But should you think a bit harder?

Tractors tend to have longer renewal cycles than some other items of kit, to the point where a 15 to 20 year old tractor is far from uncommon on even the most well equipped courses. Make the wrong choice now and you may well have to live with the consequences for many years, which in turn leads to conservative buying.

Mechanical transmission basics

A constant mesh mechanical

transmission remains the simplest gearbox offering. You know the score; a clutch needs to be depressed to change gears and swapping between working ranges, the tractor typically needing to be brought to a stop before swapping gears. A synchromesh mechanical transmission will ease gear changing on the move but many transmissions of this type will retain a constant mesh range change.

A simple forward-reverse shuttle makes it easier to change the direction of travel but with the operator using the clutch and needing to stop the tractor before changing direction. A synchro shuttle still requires the operator to use the clutch but a change in direction can be selected before the tractor actually stops. A power shuttle essentially allows the operator to swap between forward and reverse without stopping but how abruptly the direction change is made will

be down to the selected gear ratio and the speed of travel when the shuttle is used. More sophisticated shuttles will smoothly 'modulate' the direction change.

A mechanical splitter will allow the speed of the selected ratio to be reduced or increased. If an operator uses the splitter in third gear, for example, the split ratio will be between second gear and third gear. The splitter function is activated without using the clutch. On modern transmissions this is typically achieved via an electro-hydraulically engaged clutch pack with a button selector on the gear lever, sometimes described as a 'Hi-Lo' transmission.

A semi-powershift mechanical transmission provides a clutch-free 'push button' electro-hydraulic shift within a given range. Massey Ferguson's Dyna QPS 12x12 transmission is a good example of a semi-powershift as it allows gear changes

TOP: Where Kubota's HST Plus hydrostatic cruise control differs from conventional hydrostatic drive is its ability to monitor and fix the forward speed. You do not have to restrict your buying choice to a mechanical transmission for fixed forward speed work.

BELOW: Tractors with Dyna QPS mechanical transmissions are ideally suited to fixed speed applications but thanks to having a shuttle are equally at home with tasks such as loader work. When buying a tractor it pays to know how various transmissions operate and how they differ.

to be made on the move without the operator pressing the clutch pedal; the operator simply presses a + or - button on the top of the gear stick to change between the four gears in each of the transmission's three ranges. It's available on MF1500 series tractors of a nominal 47 to 59hp.

Hydrostatic transmission basics

OK, we all know about this but it's still worth doing a simple outline. Hydrostatic or 'hydro' transmissions have become the default choice for tractors that will undertake mowing and also for general duties to include front loader work. Although there are subtle differences in how they work, all hydrostatic drives employ an engine driven pump to drive a motor that, on tractors, will typically divert power to the wheels via a mechanical gearbox. The latter may offer two or more 'ranges' so increasing the transmission flexibility; low range could, for example, offer a working speed range from 0 to 5kph, mid-range 0 to 10kph and high up to 20kph.

More advanced hydro transmissions will include a cruise control. In outline this will allow the opera-

tor to set the engine throttle at the right speed to drive a mower; typically this will be to achieve a fixed 540rpm at the PTO. The tractor can then be brought up to the desired working speed on the travel pedal, the operator then selecting this as the cruise speed that will then be held automatically. Intelligent cruise control will allow the desired working speed to deviate to accommodate changes in load on the engine. Hit a thick patch of grass or start climbing a steep slope and the forward speed is reduced.

The eHydro system from John Deere and HST Plus from Kubota go a step further. Although they operate in different ways, both these transmission options allow the operator to dial in a fixed cruise speed that is in effect 'locked' to the engine speed, just as it would be with a mechanical transmission. The advantage this offers is in enabling a fixed forward speed to be matched to a set engine speed. This enables aeration kit to be operated at exactly the right forward speed to give consistent, and easily repeated, hole spacing.

Other hydrostatic transmission features to consider include anti-stall, which prevents the engine getting 'bogged down' when driving a loader equipped tractor into a

heap of material. Without anti-stall, the travel pedal will keep the demand for oil from the pump to drive motor fully open, regardless of load. This demand will become too great for the engine, slowing it down to the point where it will eventually stall unless the operator backs off the travel pedal. Anti-stall does some thinking for you, taking over the relationship between engine speed and travel pedal demands automatically. Not all systems are equal, however, with some having a setting that essentially cuts drive before the tractor wheels lose grip; others are more aggressively set and can see the tractor break traction long before anti-stall kicks in. You only find out by trying, with a degree of variation being allowed by the control software.

CVT - variable speeds with mechanical advantage?

CVT transmissions are not quite as easy to describe. In the case of the New Holland EasyDrive system, an amalgam of a variable steel belt drive and planetary gears is used, a mechanical connection between the engine and transmission remaining at all times with the claim this reduces power loss. The Fendt Vario system employs a



combination of hydrostatic pumps, motors and mechanical gears. Vastly different they may be, but the aims of EasyDrive and Vario transmissions are essentially to offer a stepless range of speeds from zero up.

In outline a CVT transmission will do what a hydrostatic drive does but with the potential to improve mechanical efficiency. Both EasyDrive and Vario transmissions use software to control the engine speed and the transmission. EasyDrive is 'simpler' than the Vario system, which in part explains why it is viable to fit it to a lower power range of tractors.

In terms of set-up, EasyDrive can operate in pretty much a similar way to the eHydro and HST Plus systems employed by John Deere and Kubota. The Fendt Vario transmission could have a couple of books written about it and these would still leave room for further explanation. But when it comes to having a setting for pretty much any application you can imagine, a Vario transmission will have a solution. New Holland EasyDrive CVT is an option on New Holland Boomer 3000 series tractors spanning a nominal 41 to 51hp. Fendt only offers a Vario CVT transmission, its tractors starting at 70hp plus.

Summary:

Choosing the right tractor can appear complicated, but if you have a list of set demands you are more likely to make an informed buying decision. The size, weight and type of equipment fitted to the tractor will dictate its weight and horsepower, but other features can make a big difference to you and those that work the tractor. The key is to ask questions, try several different tractors and talk to those you know who have a given make and model. A tractor is a long term investment so it pays to think long and hard before making a buying decision.



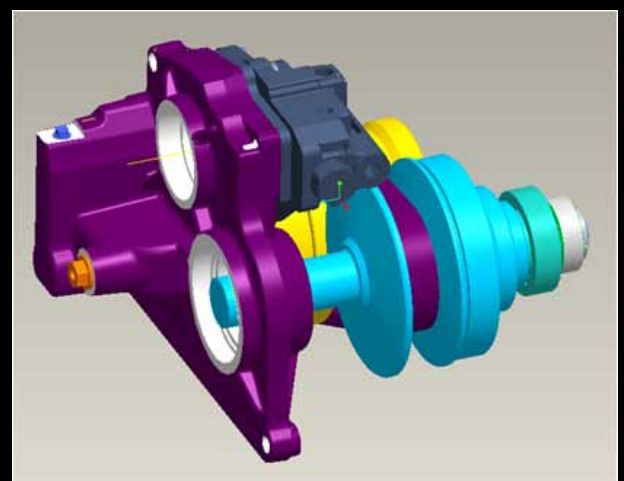
The New Holland EasyDrive CVT transmission is set up using a set of buttons mounted to the left of the operator. The main buttons are pretty easy to understand, with only Speed Set needing a bit of understanding. This control is essentially used to cap the tractors speed to 30%, 60% or 100% of maximum, in effect changing the sensitivity of the travel pedal to suit different applications.



With the John Deere eHydro transmission, setting a fixed working speed is simple; use the travel pedals to attain the desired speed and press set. The speed can then be fine tuned, on the move, using the same switch.



A shuttle forward and reverse lever makes changing direction much faster and is recommended for front loader work. The Power Reverser power shuttle on John Deere tractors allows the shift back and forth to be made without using the clutch.



A 'clever' transmission need not necessarily be complex. The New Holland EasyDrive system is a good example, combining a steel belt variator and epicyclic gearbox to deliver stepless speeds. The variator, with the engine driven pulley that drives the epicyclic sun gear, is coloured blue in the diagram, with the output pulley, which in turn drives the epicyclic ring gear, in yellow. The pulleys open and close under hydraulic pressure, clamping the steel drive band so it will not slip under extreme load. The integral hydraulic pump, shown in black, delivers 42 lpm at 2,600rpm engine speed.