

TRANSMISSION CHOICE A KEY TO THE RIGHT TRACTOR BUY

It is all too easy to divide the transmissions offered in compact tractors into two broad camps, mechanical and hydrostatic. It is equally easy to assume mechanical transmissions are best for fixed speed tasks and hydrostatic for variable speed jobs. But does this approach still hold true? James de Havilland reports...

Most operators understand the fundamental reasons why certain transmissions are favoured over another. So skip the next few paragraphs if what follows is obvious.

With a mechanical transmission, a task such as aeration can be carried out by a number of different operators. All things being equal the job should be carried out to much the same standard, with holes punched in the ground at the same spacing regardless of who has driven the tractor.

A key to this is the mechanical transmission. If an operator sets the tractor's engine speed to deliver 540rpm at the PTO and then selects a given range and gear, the aerator that is being powered by the tractor will go on to work as it did when previously operated at these speeds.

With a traditional hydrostatic drive, aeration can be tricky. Instead of delivering a fixed forward speed at a given engine rpm, a hydrostatic transmission can vary the speed according to load on the engine. Reach a slight incline, either up or down, and the tractor can slow or speed up accordingly.

All basic stuff, but it does help clarify why a mechanical transmission tractor remains the favoured choice for fixed speed work like aeration. Conversely, hydrostatic drive is the ideal choice for pretty much all other types of work. Powering a mower, hydrostatic drive options can include a 'cruise' setting that essentially enables the tractors speed to be governed by the load on the engine. Hit a patch of longer grass, which in turn puts more load on the engine, and the transmission will slow the tractor to help take the load off the engine and vice versa.

Tractor manufacturers have long recognised this, and over the past few years they have come up with alternative transmissions that are designed to mix the ease of operation associated with a hydrostatic drive with the fixed speed ability of a manual.

Among the most recent developments is the continuously variable, CVT, transmission developed by New Holland. Known as EasyDrive,

the transmission can be operated so it will deliver a fixed forward speed at set engine revs, just like a standard mechanical transmission. It is also claimed by New Holland to be extremely efficient, allowing more engine power to reach the wheels than it would with a conventional hydrostatic drive.

At present the New Holland EasyDrive system has been shown on its 45hp four-cylinder Boomer 3045. There is no 'electronic' link between the engine and the transmission, the latter combining an epicyclic system with a variator. The latter is essentially a pair of hydraulically adjusted pulleys linked by a steel drive chain; opening and closing the pulleys adjusts their respective ratios, this providing the key CVT element of the transmission.

In rough outline, the transmission can be operated so the variator operates pretty much like a hydrostatic drive. Set the engine speed on the throttle, press the travel pedal and off you go, the tractor building up speed just as it would with a 'hydro' drive. It is the combination of variator and epicyclic speeds that enables EasyDrive to run at full engine power from speeds as low as 300m/hr to 30 km/hr in a single range.

Where it gets 'clever' is with the two EasyDrive 'cruise' control modes. Again in broad outline, mode one delivers a fixed variator ratio to fix the engine and gear speed exactly like a conventional mechanical transmission. This is used for fixed speed applications to include spraying and aeration.

In mode two, the operator can select a target travel speed that will work to maintain a fixed engine speed. If the load on the engine increases to the point where it will compromise the PTO speed, the transmission slows the forward speed to reduce the load on the engine. When the peak load is reduced, the forward speed will then recover back to the target speed. This is pretty much how cruise speeds work with hydrostatic drive.

A key difference with EasyDrive is that releasing the travel pedal does not abruptly slow the tractor. As momentum is lost, the tractor will slow to a point where the transmission can reconnect drive

in relation to the engine speed. Offering the drive flexibility of a hydrostatic with the simplicity and fixed speed of a mechanical drive, EasyDrive looks like it has a lot to offer.

The John Deere eHydro transmission offered on the 3720 tractor matches well proven hydrostatic drive with electronic control. It is a clever system, with the added attraction of being really easy to set up. As an example, the transmission can be set to deliver a forward speed of say 3.01 km/hr at 2,400 engine rpm. At these speeds, the rear PTO will be operating at 540rpm.

With a conventional hydro drive, this forward speed to engine speed ratio is not fixed. An increased load on the tractor will see the transmission essentially slow the tractor while the engine and PTO speeds are maintained. With eHydro, the operator can set the transmission so as the load increases, the engine, PTO and forward speed will all be linked.

So if the tractor slows, so does the engine and PTO. This is just what happens with a mechanical drive and a key reason why a conventional hydrostatic tractor is not the best tool for aeration work; the hole spacing will be directly influenced by the load on the tractor. With eHydro, the hole spacing remains constant even if the tractors working speed varies in accordance with load.

Of equal importance, the eHydro system does not take a long time to understand and set up. An eHydro novice can be up and running quickly, the system making it easy to replicated fixed settings to suit a specific job.

There are those who will counter this by saying a mechanical transmission tractor makes life even easier. Just select the gear you need to achieve the desired forward speed and throttle up to get 540rpm at the PTO. For most sports and amenity work, this works fine and it is easy for the operator to remember what gear speed, range and engine rpm suit specific tasks.

With eHydro or EasyDrive, it is possible to adjust the tractors engine speed and forward speed to achieve what you want. This is really useful when aerating as it allows the hole spacing

continued on page 34



In applications, such as mowing, the New Holland EasyDrive can be operated just like a hydrostatic transmission tractor, the operator either using the floor mounted travel pedal to 'manually' vary the driving speed or fixing a 'cruise' speed that can automatically take into account varied load on the PTO.



EasyDrive 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.



The eHydro transmission option on John Deere 3720 tractors offers all the features of a conventional hydrostatic drive with added control. It is easy to set up the tractor to run at a fixed forward speed, even after changing the throttle setting.

to be right for the job as opposed to what the tractor will let you deliver.

Kubota's 'intelligent' HST Plus transmission is offered on its GL40 series tractors and again it is pretty easy to understand and use. In broad outline, think of a standard hydrostatic transmission with three ranges to suit low, medium and transport speeds. Kubota then supplements this with various advanced features.

These include its Hydro Dual Speed system. This allows the operator to shift between ranges without having to stop and is great when you want to have a low speed to work with a loader and then shift to a higher ratio to take that load to a trailer. Stall Guard can be selected to allow a loader combination to push hard into a heap without the risk of the engine 'bogging down'.

Another feature is Auto Throttle Advance. With a conventional hydrostatic drive, the drive pedal controls the speed, the engine speed being controlled by the throttle. With the Auto Throttle system, the engine speed will drop to idle when the tractor is stopped by the travel pedal. Sounds a small detail, but it really is a great feature not to have the engine revving hard when the tractor is not moving.

For those who prefer to stick with a mechanical transmission, there are choices that enable the operator to 'change on the move'. There is



Kubota offer its HST Plus hydrostatic transmission on its GL40 series, advanced features enabling the operator to select fixed cruise and automatic engine idling features. The key is to look more deeply into what transmissions are on offer and not assume they are all the same.



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.

nothing new in this, powershift on higher powered tractors having long been established. But smaller tractors have tended to have perhaps a splitter and that is it.

Massey Ferguson offers its Dyna QPS™ transmission as an option on its 38hp MF1540 and 46hp MF1547. Incorporating both a Power Shuttle and Power Shift, the 12 forward/12 reverse mechanical gearbox combines the positive drive of a three-range clutched gearbox with a clutchless change-on-the-move transmission.

Power Shift allows the driver to change up or down between the four speeds in each of the gearbox's three ranges without affecting power delivery or momentum. Up and down gear changes are activated by pressing a pair of switches mounted on the side of the range-change lever. This is ideal for tasks such as spraying, fertiliser spreading, top dressing, mowing and turf aeration.



The Massey Ferguson Dyna QPS™ 12 forward/12 reverse transmission incorporates both a Power Shuttle and Power Shift which combines the positive drive of a three-range clutched gearbox with a clutchless change-on-the-move transmission.

All MF1540 and MF1547 tractors specified with Dyna QPS transmission are fitted with an enhanced instrument panel that incorporates an LCD screen displaying the shuttle lever position, the selected Power Shift ratio, the selected range ratio, PTO speed and other tractor information such as fuel level, coolant temperature and fixed and resettable hourmeters.

A key point to remember is that modern tractors can offer features that simply were not available barely a decade ago. It is possible to buy a 30 to 50hp model that offers a considerably more versatile transmission. With a growing emphasis upon precision working, choosing a tractor that makes it easier to work at the speed the application demands is now easier.