

E-Bikes - by Eugene Hui

Three years ago I rediscovered the sublime pleasures of riding a bicycle for long leisurely journeys around the countryside. This was because I bought a modern electric bicycle -- an 'E-bike'.

Before I bought my first E-bike and then subsequently a second one -- a secondhand E-bike for my wife -- I undertook some extensive research into E-bikes and also tried out several models. I feel it could be useful for me to share some of my findings and conclusions in respect of finding the correct bike with other U3A members who might not previously have considered acquiring an electric bicycle -- or who might have considered it but were unsure how to choose the right one.

I have to say that the supreme pleasure and practicality of an E-bike is that it allows you to regulate and set the level of exercise you want at a constant and comfortable level, whatever the terrain. By combined adjustment of the power assist levels available from the motor in combination with the correct gear, one can cruise along and just focus on enjoying the sights, sounds and smells of the countryside around you without sweating or agonising more than you want to do, up hill or down dale. Within Lincolnshire, I generally have the motor assist switched off 75% of the time but it gives me the confidence to go for a 20 to 30 mile ride without hesitation and not worry about whether I will struggle to get back to base or home. I have also been encouraged by this to undertake longer expeditions abroad or to ride through more hilly terrain.

I would recommend all U3A members to try one! (More details on where at the end). And now, onto some specifics.

The **first** consideration is the size and layout of the frame. There is the traditional high gent's cross bar type, secondly a very low U-shaped step through type frame and then various versions of a sloping crossbar at varying angles as an intermediate between the gent's crossbar and U-shaped step through. Anyone with joint troubles should probably look for a step through -- or at least a very low diagonal style which allows you to stand firmly astride the bike without difficulty when coming off the seat.

Bicycles designated as mountain bike styles tend to have a more fore-shortened and compressed frame layout with straight horizontal handlebars laid perpendicular to the long axis of the bike. Bearing in mind that these may not give a comfortable riding position for ordinary road use and the angle and generally low height of the handlebars will put more body weight on hand and wrists, these may not be good for those with any joint problems!

Some form of seat post shock absorber suspension and front-fork suspension is worth having in my opinion for those longish rides. If the front fork suspension has a very long travel, check if it can be locked up solid with a knob control as some people might find the steering bounciness unsettling, especially on braking.

The **second** and important consideration is the type of motor system. These fall into two types:

A) a mid motor or crank drive directly connected to the centre pedal crank and augmenting pedal effort;

B) a hub motor mounted in replacement of either the front wheel axle or the rear wheel axle. It is important to note that a front hub motor will make it much more difficult to remove the front wheel if you are planning to carry the bike in your car, and conversely a rear hub motor will have a theoretical advantage of driving the wheel with more (rider) weight on it preventing wheelspin in slippery conditions or going uphill.

The **third** but very important consideration determining how the bike feels to use lies in the type of control system for the motor. This includes the type of sensor(s) it has and also the software program embedded in the motor controller which determines how and when it delivers power to your pedalling and this can radically change how the bike responds and feels in assisted mode. The three main crank (mid) motor manufacturers today are Yamaha, Bosch and Shimano. They tend to have their own software program style and it is sold as a unified package with their motors which are then implemented as a package by different E-bike brands.

Sensors for the software program can be either pedal rotation speed (cadence) sensors or pedal effort (torque) sensors or a combination of both. Bikes without a pedal torque sensor and only a pedal speed sensor give a more abrupt on/off feeling to the motor assistance. On the other hand bikes with pedal torque sensors, on the whole, give a more progressive and natural feel to the assistance with power assist feeding in gradually and often imperceptibly, being proportionate to your intended effort.

I have found that hub motor bikes often come with a less sophisticated sensor system and software program which then gives them a more jerky feel. In defence of hub motors combined with a simple pedal rotation sensor, this type can suit someone who is slightly disabled or who simply does not want to expend any effort as these E-bikes will be set up to trigger once you reach a minimum and low pedal rotation speed. Thereafter they keep driving the bike regardless of how little effort you put into pedalling, as long as you simply keep the pedals rotating passively.

The only way of finding out what is right for you is to ride as many different examples as you can of E-bikes with different drive systems and from different manufacturers.

TWIST THROTTLE or PRESS BUTTON THROTTLES.

These became illegal to sell new after January 2016 for use on public roads and cycleways, if they assist the bike beyond 4 mph. However, examples made and sold in earlier years are not illegal to use if you buy one second-hand. There are also websites which will tell you how to de-restrict recent throttle grip controls "for off road use only".

BATTERY.

Capacity and longevity are the important considerations as a replacement battery

usually will cost as much as a third of the price of a new E-bike, ie. several hundred pounds. When buying a used or old E-bike if you have to replace the battery this can often cost as much as the bike. Ballpark prices for a 10-12 amp-hour lithium ion battery will be £250-£350 and batteries will also lose significant capacity after 2 to 3 years or after more than 500 recharge cycles. Keep this in mind when buying used on eBay or elsewhere and additionally it will be very difficult to find replacement batteries for non 'big brand' names.

Older sealed lead-acid battery powered E-bikes will have poor range and are less efficient because of poor power to weight ratio unless you are extremely handy at DIY and can rewire and mount a modern lithium ion battery in its place. Old lithium ion batteries can sometimes be internally renewed with cells bought off the Internet but this procedure is best left to an expert specialist service as lithium ion batteries need internally wired battery management systems (BMS) which prevents the lithium ion cells being destroyed by over charging or from catching fire or exploding.

RANGE IN ASSISTED MODE.

This is heavily dependent on three factors: Rider weight, how many hills or slopes there are, and also on Rider pedal energy input. Take manufacturers' quoted figures as a best case scenario with non-overweight riders, on a level road and using economy mode on the motor assist. Expect about 20-30 miles assist in a best case scenario for a 10-12 amp-hour (360 watt-hour equivalent) battery. Check the battery spec before you buy.

EQUIPMENT.

In-built lights which are run off the main battery are nice to have albeit they are unlikely to be bright enough to light the way in darkness or dusk. However, it is easy to get extremely bright wideangle front lights (LED) which come with their own small battery pack to click onto the handlebars for about £16. These will last for 3 to 4 hours use on battery.

GEARING

Bicycle gears can come as the derailleur type or the internal rear hub type. Because one can adjust the motor power assist level (commonly three, four or five levels whilst on the move), just 6 to 9 gear ratios are sufficient. However there are some subtle differences in gear ratios chosen by different manufacturers to suit different countries and markets. This is particularly relevant to the top or highest gear and I have had to change the gearing on one of my E-bikes to facilitate a higher speed without having to pedal furiously. Bear in mind that this will be easier to do on a hub gear system as you can shift the whole range with change of just one rear chain sprocket. Derailleur gears tend to be more restricted in this respect

Incidentally, motor assist is legally limited by EU regulations up to a maximum of 15 mph on public roads but you can freely pedal over that speed albeit the motor assist is programmed to cut out above 15 mph.

WHERE TO TRY -- Some suggestions:

Navenby -- A bicycle shop dedicated to only e-bikes (pedalelectriccycles.com) is located by the side of the King's Head pub and will let you try out several models.

Doddington Hall -- there is a large bike shop there with the GIANT brand of E-bikes. They will also hire them out for a few hours or days.

Newark on Trent -- Tallis Auto Stores opposite the new Lidl supermarket on London Road sells EBCO hub drive E-bikes.

Coningsby -- Cleveland Cycles on the High Street in Coningsby stock GIANT, WISPER and BatriBike brand of electric cycles.

Some Wilco stores and the Lincoln Cycle Centre (Newark Road) do stock cheaper hub drive E-bikes but may not provide good aftersales support.

Further afield -- Manchester's Harry Hall Cycles is a gigantic store with multiple brands of E-bikes which you can try out.

Prices -- used £150-£500. But beware of old lead acid battery driven bikes. New bikes are £500-£4000 but a good bike can be had for about £1200.

MORE INFO

For all things E-bike including reviews and a useful forum:
www.pedelecs.co.uk

What more can I say? Do have a go on one!

Eugene Hui.