Something that isn't mentioned often is the efficiency of a motor. What power are we talking about when we state 200Watts … in the copper coils, due to reluctance between the magnetic fields, due to the harmonics generated when operating.

Efficiency is one factor that explains different performances of similarly specified ebikes. Ideally a low-medium nominal … gives you the power reach you might need without creating unhealthy demands on your battery system and your wireharness.

Peak Power – this is the maximum power output a motor can achieve for a few seconds. It is a better indication of performance than than the nominal power which is usually quoted.

Position of the Motor

There are 2 commonly used drive positions for the motor on ebikes. You guessed it…there are pros and cons to both. Why A Hub Motor?

With electric assisted and electric powered bicycles, scooters and motor cycles selling in the millions of units world wide … an electric vehicle to the one of the most useful and practical drive systems for electric vehicle (EV) applications.

For electric bikes, the advantages of a hub motor are:
1. The motor is in a space that is not otherwise used in the conventional designs of bicycles.
2. The motor can be installed without significant changes in the frame or the ordinary configuration of the machine making them perfect for conversion kits.
3. Hub motors are simple and self-contained, thus reducing overall cost of the vehicle by enabling the designer to use off-the-shelf parts and designs for their vehicle.
4. The motors are sealed and mostly maintenance free.
5. The motor is directly attached to the driven wheel, improving efficiency.
6. The centre of gravity is relatively low, improving balance.
7. It looks nice!
8. If it needs to be serviced, repaired or replaced it can be easily accessed.
9. If it does need replacing it usually does not affect any other component.
10. With hub motors we can replace one hub motor with an updated version if the old one is no longer manufactured. This ensures your product will never become redundant.
11. If you have a front hub motor then you can have a 2 wheel drive bicycle assuming you will provide human power to the rear wheel. This can have a number of useful consequences.

The Drawbacks of Hub Motors

For hub motors, the drawbacks are:
1. The cost is higher because the motor is more complicated than other kinds of electric motors.
2. Because the motor is sealed against water and dirt, getting rid of heat that the motor generates while turning can be a problem, luckily many controllers monitor motor temperature.
3. The wheel is heavier with the addition of the motor...by as little as 2.3Kg
4. There are hundreds of hub motor manufacturers in China and all of the motors look the same but only a handful are what we could call a reasonably made product.

Why a Crank Drive Motor?

Since Panasonic and Yamaha put their considerable commercial weightiness behind this type of drive system sales in Europe have rocketed. Sales in the US have been far slower due to the systems lack of how do I put it….grunt.

Despite the performance drawbacks crank drive systems can be the 'nicest' systems to ride.

Advantages of a crank drive system:
1. Standard lower cost motor design can be used with a single external drive shaft and a fanned heat sink casing.
2. The motor can be smaller because the fanned casing allows for heat to be more effectively released.
3. The motor is generally in or near the bottom bracket so the weight is low.
4. The motor can be kept near its optimal operating speed by using the bikes gearing.
5. By using the bikes gearing the bike can provide more effective assistance on hills than same power...
6. Because of the low power levels used the systems tend to be reliable.

Disadvantages of a crank drive system:
1. The units are always sealed and contain almost all of the components, motor, controller, and torque sensor. This means if one component fails, the whole system has to be replaced, increasing the cost of maintenance and repair.
2. The systems are proprietary and if parts become unavailable it will be very expensive to adapt another system to fit.
3. The output power and therefore performance is limited by the strength of the chain and the sprocket. Standard chains are designed for human power only, which means the amount of mechanical power that can be added is relatively small.
4. There will be increased maintenance on the drive chain, including all cogs and sprocket.