



## The 4 Parts to the Power Train of your Electric Model Airplane

Electric model airplanes are a great way to get into the model airplane sport or to leave the fuel and oily mess behind if you are already using glow or gas engines. Electric is quiet, clean, and electric model airplanes can be flown in more environments than glow fuel powered airplanes as they make little or no noise.

Electric model airplanes contain a few different pieces of equipment that set them apart from their glow cousins. The electric motor, an electronic speed controller (ESC), high powered batteries and possibly a gearbox make up the power train i.e. all the components of the drive system of your electric model airplane. Understanding how these parts work together can ease the transition from a fuel-based engine to an electric motor.

First, motors for electric model airplanes come in two forms, either 'brushed' or 'brushless' and there are subcategories of these as well. Without going into detail, brushless motors are constructed and operate more efficiently than brushed so deliver more power and/or more flight time, but the cost of a brushless setup can be substantially higher.

Brushed motors, sometimes referred to as canned motors, are very inexpensive but deliver less power than brushless models. Most pre-packaged electric model airplanes come with a brushed motor and leave it up to the consumer to make the upgrade to brushless if they wish to do so. With the popularity of brushless powered electric model airplanes rising, more brushless packages are available and will soon be the standard electric model airplane power plant.

Second, an Electronic Speed Controller (ESC) regulates the amount of power being fed to your electric model airplane motor. The ESC sits between the battery and the motor and is wired to your throttle channel. When you increase the throttle via your radio transmitter, the ESC feeds more juice from the battery to the motor, increasing its RPM and making your model fly faster. Most ESC will work with only one kind of motor, brushed or brushless, but there are some electric model airplanes available that will work with either.

Third, a gearbox. Electric motors are usually most efficient at high rpm. However, you may need to lower the rpm to make the propeller more efficient or to fit a larger prop. A gearbox will then be included in the power train. So it will depend very much on the model whether a gearbox is required or not.

Fourth, the flight batteries. There are too many types of electric model airplane battery to list them all, but the most common types are Nickel Cadmium (Nicad), Nickel Metal Hydride (NiMH), and Lithium Polymer (Li-Po). The two nickel based batteries are primarily for use in brushed airplane configurations where cost is the primary consideration. The power output from these batteries is not constant. They start off strong and slowly give out less power till finally the airplane runs out of power, can no longer

sustain flight and needs to come in for a landing.

Li-Po batteries, on the other hand, are known for their ability to have a very constant power output. They are just as strong at the end of a flight as they were at the beginning. Powering your RC model airplane with a Li-Po battery is the only way to go when using a brushless motor, but, and a big but - they can be dangerous if not managed properly. Incorrectly charging or discharging a Li-Po battery has been known to cause toxic smoke, fire, and in some cases explosions.

The batteries for a ready to fly model will be supplied connected in series and/or parallel according to the power output requirement and usually held together in a plastic sleeve. Whether batteries are connected in series or parallel affects the performance of the batteries and needs to be carefully considered.

When you move on to building your own electric model airplane you will be able to determine the configuration that best suits your needs and the available space in your electric model airplane. You will always want to have at least two battery packs available when you go flying as well as recharging facilities in order to get maximum flying time.

Careful management of your batteries will give you maximum battery life and usefulness. Follow the manufacturer's advice on connection and charging times very carefully. There are differences between the batteries used in your radio equipment which are trickle charged with a small current over a long period and which will withstand being overcharged. Flight batteries, on the other hand, are designed for fast charge and fast discharge but will be damaged and are potentially dangerous if overcharged.

So ARF and ARTF electric model airplanes or park flyers are a quick and easy entry to electric model airplanes with everything pre-installed and pre-set. But when setting out to do your own installation of to design an electric model airplane be sure to seek the help of someone experienced with electric model airplanes.

With so many different choices and configurations available it can be confusing. So make sure that you take advice from your instructor or club colleagues before committing either your money or your time – and always get advice from a specialist on the charging and use of the high powered lithium based batteries. And always, always follow the manufacturers advice.

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Bruce Bird makes it easy for the beginner to quickly get a grasp of the broad range of exciting activities that make up airplane modeling. To receive his free 5 part mini-series visit [Model Airplane Secrets](#)