Introduction to Electricity

Handout

Electricity is often taken for granted. You press the switch on the power tool and the tool roars into life. But what really happens?

To make a power drill work, current has to flow through the wiring in the power drill to the area that needs it (the area of demand), in this case, the motor. Often, you use an extension cord to connect the drill to the power source. If this extension cord becomes disconnected from either, the power is interrupted, and the drill stops.

Electrical circuits

Electricity travels in closed circuits through a conductor. Anytime a circuit is broken, the electricity can't flow and stops. In the example of the drill and extension cord, the drill's cord and the extension cord are the conductors.

Electrons

The driving force in electricity is the electron. This is a tiny particle with a negative charge. It will flow along a conductor because of what is called electromotive force (EMF). Electrons move from one location to another because of the differential in EMF. That's why lightning occurs: the bolt of lightning consists of electrons moving through the air to a point of differing charge. Negative EMF flows to positive EMF and vice versa.

Resistance

When electrons are moving through a conductor they meet with resistance. When water flows through a pipe, the walls of the pipe contain and slow down the water. The same is true for electrons, they are slowed down by the conductor.

Some materials conduct electricity better than others. Metal is usually a good conductor (that's why wiring is made out of metal), and wood is not a very good conductor. Rubber is a poor conductor
of electricity.

Voltage

EMF can be considered pressure or a type of force. For example, when a dam is opened, there is the pressure of all the water behind it. That water is forced through the dam under pressure. That's how electrons move along a conductor, they are pushed by the EMF. The harder the push, the greater the voltage.

Avoid the closed electrical circuit

Electric shock happens when a person becomes part of the electrical circuit. Take the example of the power drill and extension cord. Say the cord is damaged and the internal wiring is exposed. You pick up the cord near the damaged area. Immediately the electrons flow into you (you're now the conductor). The electrons then move to the ground you are standing on. The power drill will stop working, since now the electricity is going through you and not the extension cord.

You will probably stop working too.