Real-life applications of static electricity

Uses

All make use of electrostatic forces

What type of force?

Attraction

Dust extraction

Air that is carrying dust particles passes through an electrified grid that gives the particles a charge, The air then passes plates with the opposite charge, causing the dust to stick to the plates (and be taken out of the air).

Paint spraying

Paint droplets are charged as they leave the spray gun. The object has the opposite charge so the paint is attracted to the object and coats it evenly, including areas that are facing away from the spray gun. This also reduces paint wastage.

Repulsion

Crop spraying

Fine droplets are charged as they leave the sprayer. The droplets all have the same charge so they repel each other to make a larger cloud of droplets that will cover a bigger area of crops.

Dangers

All involve sparks (making them safe or avoiding them)

Describe where friction occurs

How is the spark made safe?

Low-resistance discharge route

Lightning conductors

Metal spikes on tall buildings, connected to the ground by metal strips that provide an easy path for the lightning's electricity to follow so that it does not pass through the structure of the building (so avoiding damage and fires).

How is sparking avoided?

High-resistance discharge route

Touch-pads

For example, on metal filing cabinets. They prevent people from feeling an electric shock by allowing the static electricity to discharge more slowly than it would through a spark by reducing the amount of current that can flow.

Low-resistance discharge route

Bonding line for aircraft refueling

Fuel can accumulate a static charge when it is pumped through pipes at high speed. A copper cable is connected from the fuel tank to the ground so that any static electricity is removed before it can build up, so avoiding sparks and a fuel explosion.

Bonding strap for electronics

Electronic components can be damaged by electric fields that are created by static electricity. When engineers handle the components they wear conducting straps that prevent the build-up of static electricity.