

What is an X-Ray Tube?

Like a light bulb, an X-ray tube is essentially a simple device for generating a particular kind of electromagnetic radiation. Each one is made up of a negatively charged cathode and a positively charged anode. Like a light bulb, the cathode contains a filament. Voltage, or current, is applied to the filament, producing a stream of electrons that hurtle the short distance into the metal anode at nearly the speed of light. The collision produces X rays.

The cathode/anode assembly sits in a lead-lined housing to prevent radiation from being emitted in all directions. A vacuum is created within the housing so that the electrons can move with the greatest possible speed from the cathode to the anode. A hole in the housing directs the X rays out of the tube.

The penetration power of the X rays coming from a particular tube is dependent on the level of voltage it can handle. Tubes that run at 40,000 volts (40kV) can penetrate a small sample of material. Generating medical X rays that can penetrate the human body requires 160 kV.

Baggage inspection X-ray tubes run at 160, 250, and even 300 kV.

Only about a half of a percent of the total energy in an X-ray tube

is converted to useable X rays. About 99.5 percent of the energy becomes useless heat. Varian's X-ray engineers have developed and patented a

number of ways of dealing with the unwanted heat, so that Varian's X-ray tubes last a long time and produce quality images reliably and safely. ■

