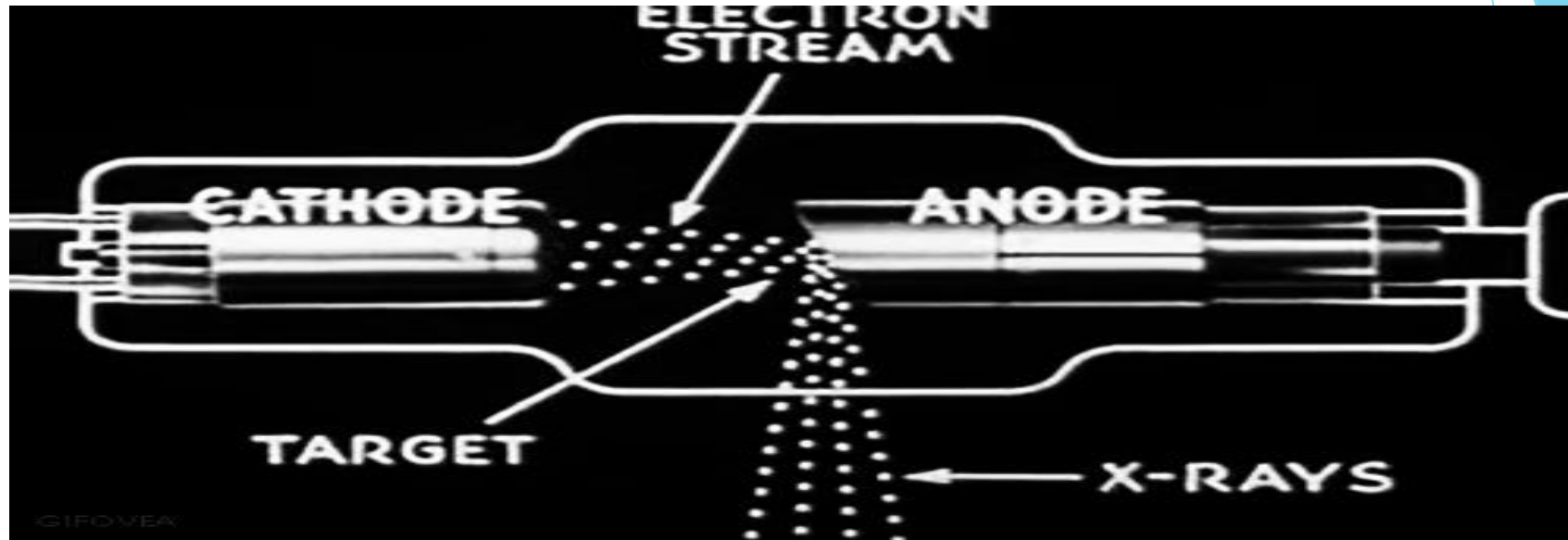


X-RAY APPLICATIONS

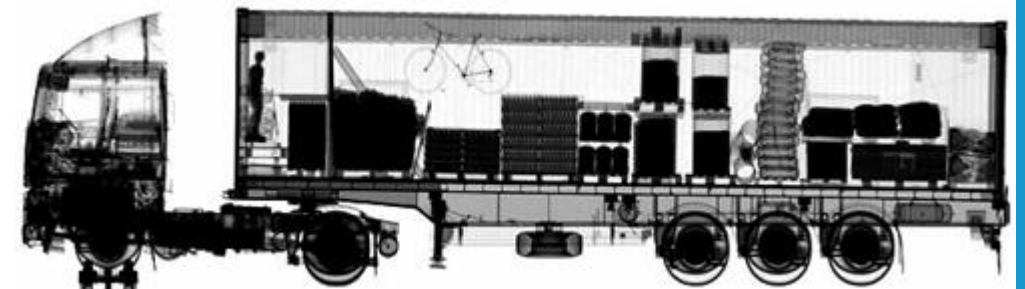
**Dr. Eng. Abdel-Nasser
Saber**

X-RAY Production



Applications

X-RAY INSPECTION FOR VEHICLES



Applications

Mars Science Laboratory

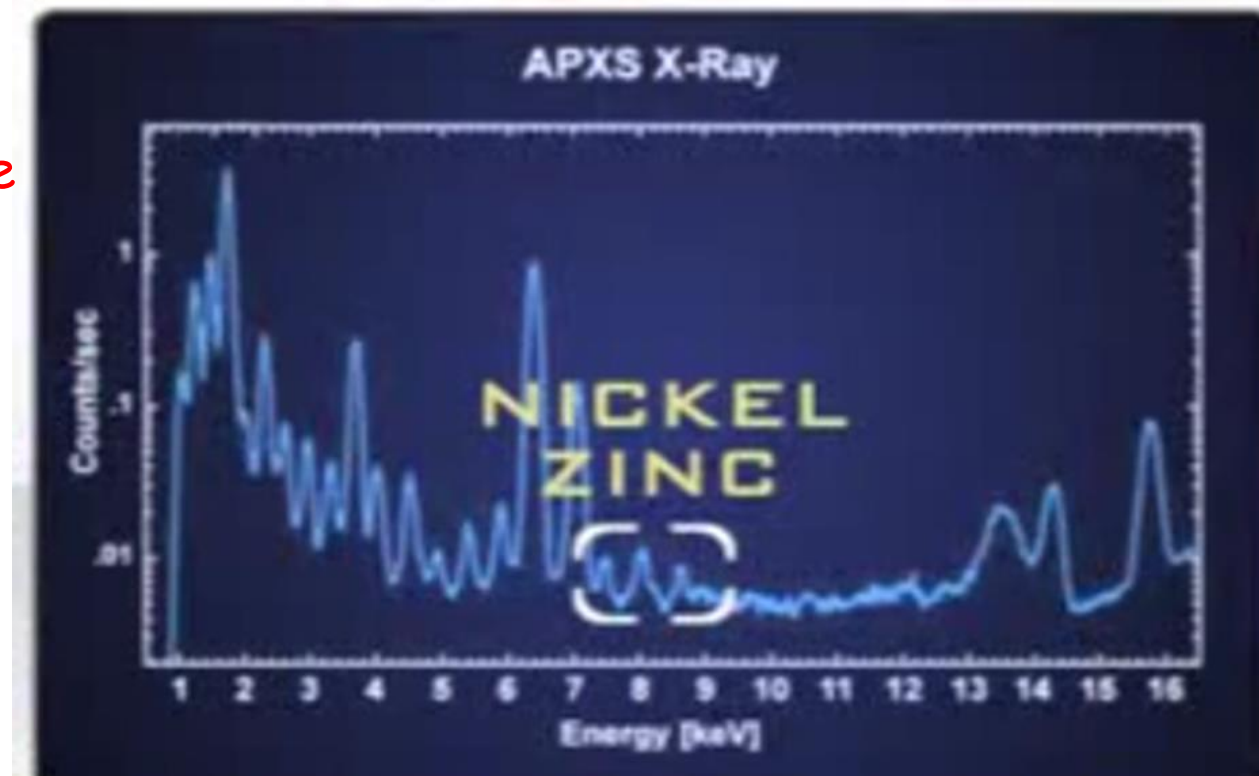
It's a instrument called CheMin: CheMin is short for 'Chemistry and Mineralogy', and it is an X-ray diffraction and X-ray fluorescence analyzer. **It will identify and quantify the minerals present in rocks and soil** and thereby assess the involvement of water in their formation, deposition, or alteration. In addition, CheMin data will be useful in the search for potential mineral biosignatures, energy sources for life or indicators for past habitable environments.



Applications

CheMin directs a beam of X-rays through the powdered material. X-rays, When the X-ray beam interacts with the rock or soil sample, some of the X-rays will be absorbed by atoms in the sample and re-emitted at energies that are characteristic of the particular atoms present.

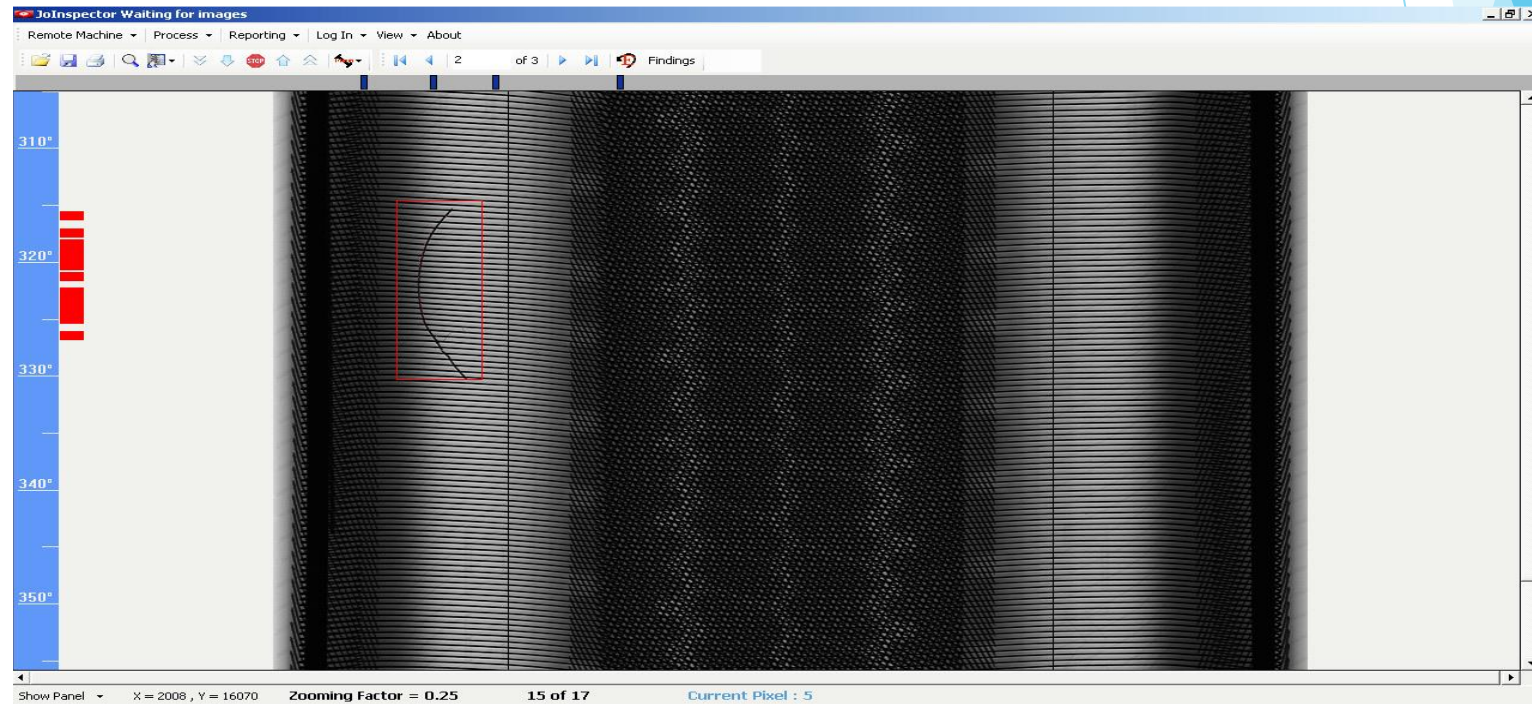
In X-ray diffraction, some X-rays bounce away at the same angle from the internal crystal structure in the sample. When this happens, they mutually reinforce each other and produce a distinctive signal. Scientists can measure the angle at which X-rays are diffracted toward the detector and use that to identify minerals.



Applications

For radial passenger, truck & bus tires, rely on Coll-Tech - the Power of Precision

Coll-Tech X-Ray ADR is a necessary solution for every tire manufacturer who wants to assure that only the best radial tires, whether they are passenger tires, truck and bus tires or over-the-road tires, are shipped to their customers.



The image shows a vertical tire balancer machine. A black tire is mounted on a central vertical shaft. The machine has a yellow cabinet on the left and a green metal frame on the right. A blue banner with white text is at the bottom left. A yellow warning triangle is visible on the lower right part of the machine.

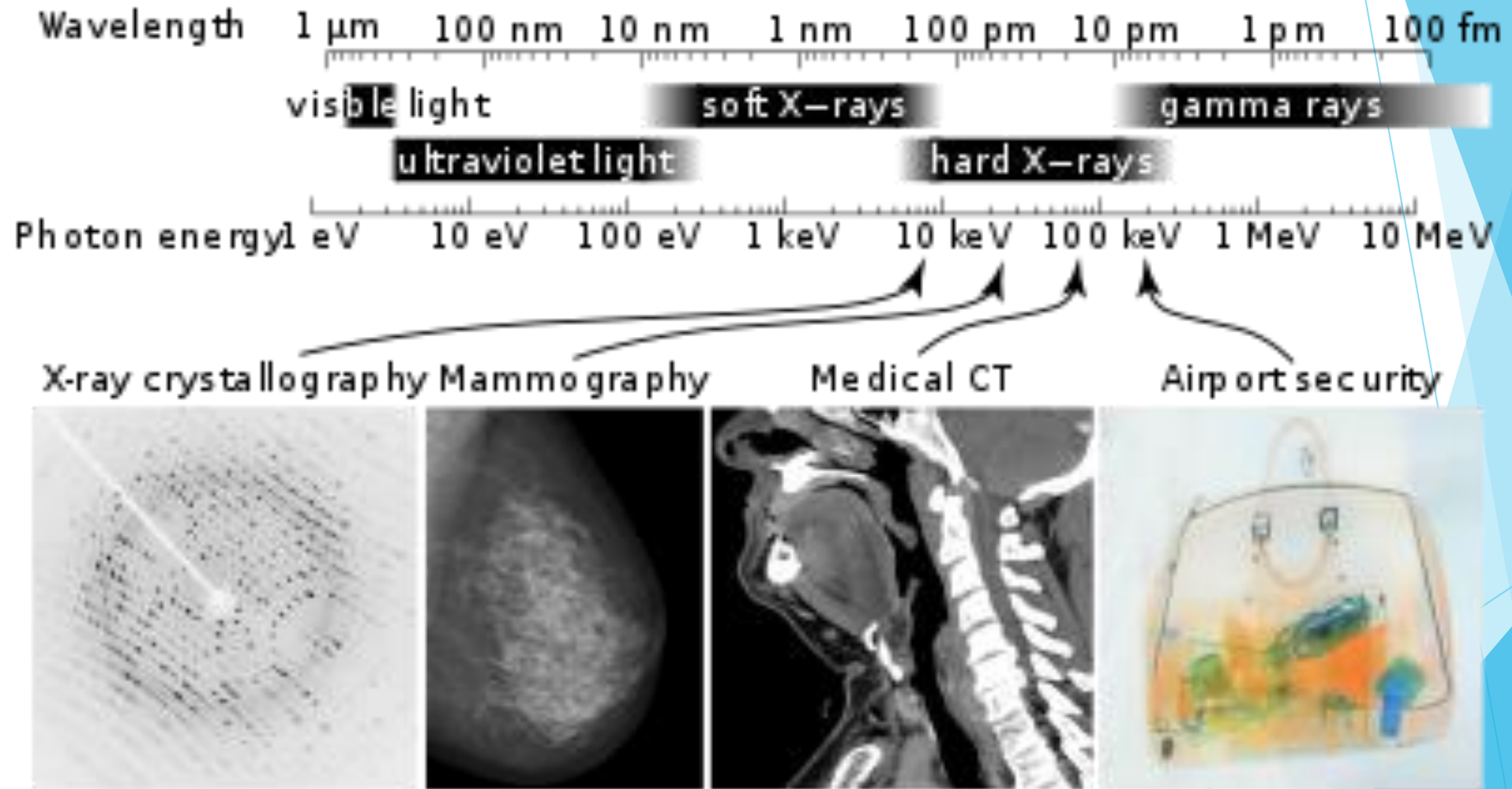
VerTiX-PLUS

Applications

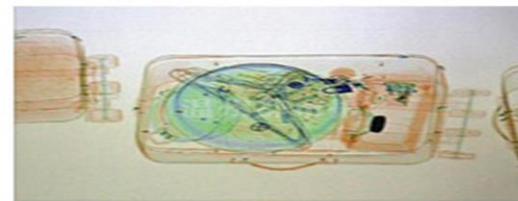
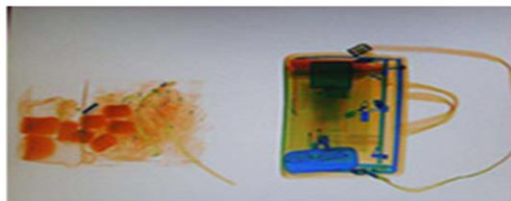
(III) COLL-TECH VERTIX-PLUS X-RAY SYSTEM



Applications of x-ray



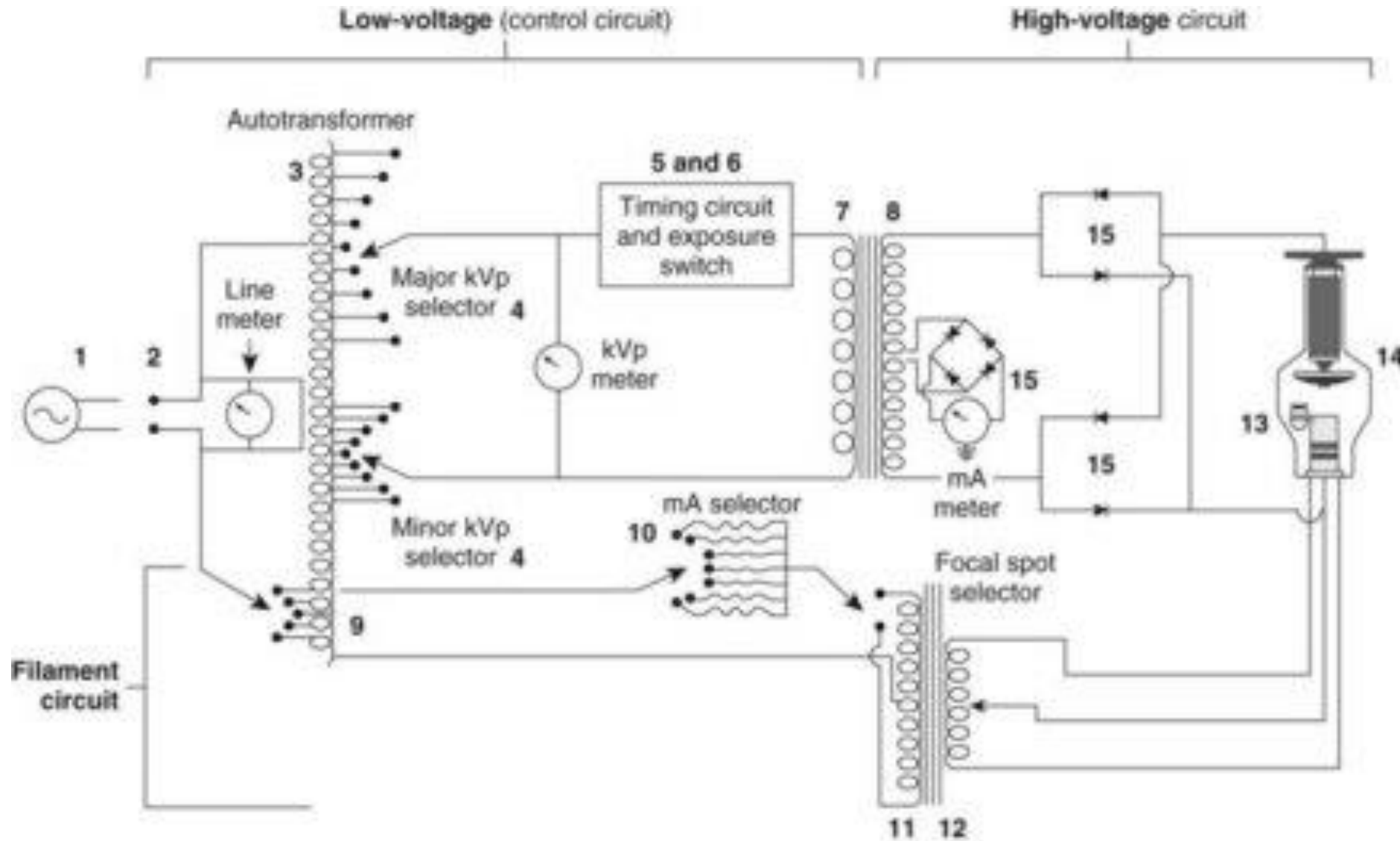
➤ X-ray scanner



➤ *X-ray scanner*

1. Circuit diagram
2. Benefit of it
3. Idea of x-rays scanner
4. Types of scanner

➤ Circuit diagram



- *Benefits of x-ray scanner*

- Security



- monitoring passenger baggage at airports for weapons, bombs and drugs

➤ *Idea of x-ray scanner*

- ❑ X-rays are released by a **pair of detectors on opposite sides**, so the contents of the bag absorb some of these rays, which means that x-rays passing through **the luggage will be at lower energy levels than other objects**. The energy and place of the objects are recorded, and then a filter is placed in the way of the **second detector beam to stop the low-energy X-rays**, which means that the second detector will be able to transmit high x-ray energy. By comparing the results, the structure and density of the luggage are made. The algorithms inside the computer automatically identify any suspicious objects and illegal substances, where each material has a mass and density different from the other, which reduces the false alarms and increases the efficiency of control and safety.
- ❑ Luggage scanners use this technology. Once the luggage is inside, one side of the scanner releases X-rays. These X-rays pass through the bag and some of the energy of the X-rays is absorbed by the various objects in the bag.

Idea of x-ray scanner



| Material Type | 3 Color | 6 Color | Examples | Possible Threats |
|----------------|---------|---------|-------------------|-----------------------------|
| Organic | Orange | Brown | Wood, oil | C-4, TNT, Semtex |
| Low Inorganic | Orange | Orange | Paper | Cocaine, Heroin |
| High Inorganic | Green | Yellow | Glass | Propellants |
| Light Metals | Green | Green | Aluminum, Silicon | Gunpowder, Trigger Devices |
| Heavy Metals | Blue | Blue | Iron, Steel | Guns, Bullets, Knives |
| Dense Metals | Blue | Violet | Gold, Silver | High-Value Contraband |
| Impenetrable | Black | Black | Lead | Shielding for Above Threats |

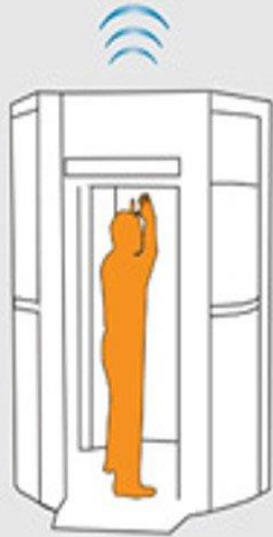
Idea of x-ray scanner

- ❑ An image is then digitally constructed, describing not only the shapes, but also the material of objects inside the bags by representing them with different colors. Denser materials like metal or glass are represented by darker colors, while food and cloth etc. are represented by lighter colors.
- ❑ Orange represents organic materials, while darker colors represent denser materials (Photo Credit: Mattes/Wikimedia Commons)

- *Types of x-ray scanner*



Backscatter X-ray scanner



Millimeter Wave Scanner



- ❑ The major difference is that a **backscatter X-ray scanner** requires **two pictures to** be taken – one of the front and one of the back.
- ❑ **Millimeter wave scanners**, on the other hand, produce a **single 3D image**. Millimeter wave scanners are also much safer, as they emit far less energy.

- Applications of x-ray

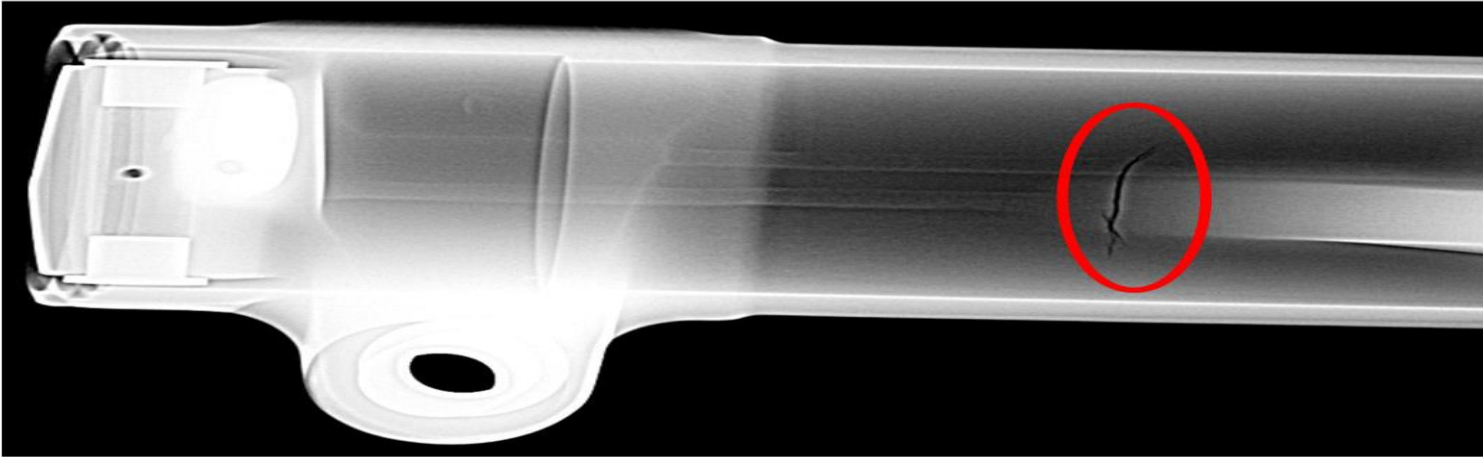
- Medicine



- ❑ Radiology in medicine to detect teeth and bones and fractures and locate the solid objects such as fragments or bullets in the body, as well as the detection of tumors in the body and treat it .

- Applications of x-ray

- Industry

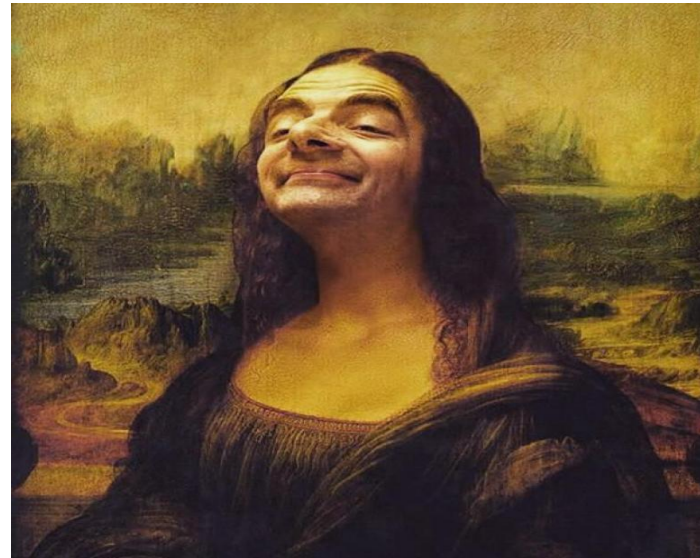


- X-rays have also been used in the industry to detect the cracks and cracks in metal molds and wood used in the craft industry

• Applications of x-rays

➤ Art

- ❑ it was used to identify painterly methods and to distinguish between **real paintings and counterfeit paintings**,
- ❑ because the colors used in the **old paintings** contain **many metal compounds that absorb X-rays**.
- ❑ The colors used in modern paintings are organic compounds that absorb X-rays less.



- study of solid objects
- ❑ Using x-ray diffraction