FAULTS IN X-RAY TUBE AND IT'S CARE

Causes of X-ray Tube Failure:

- All causes of tube failure relate to the thermal characteristics of the tube.
- When the temperature of the anode during a single exposure is excessive, localized melting and pitting occurs.
- These surface irregularities lead to variable and reduced radiation output.
- If the melting is severe, the tungsten vaporizes and can plate the port. This can cause added filtering or interference with the flow of electrons.
- If the temperature of the anode increases to rapidly, the anode can crack and then become unstable in rotation.

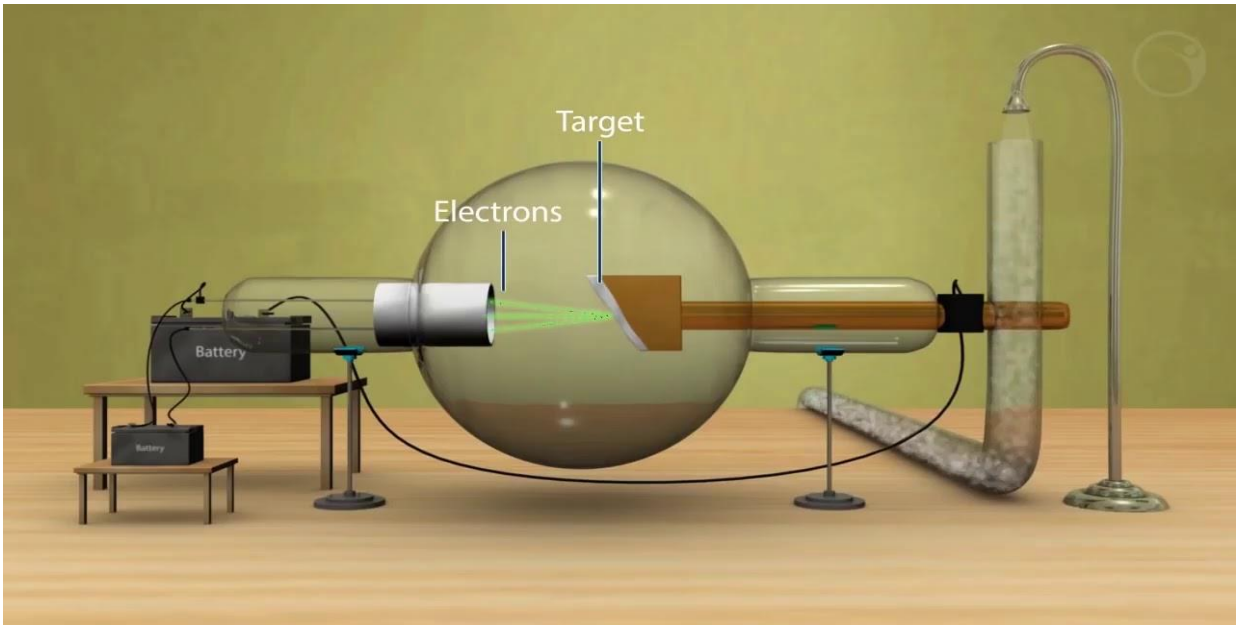

Fig (1): X-ray tube system

COMMON CAUSES OF TUBE FAILURE:

- Extremely high voltage
- Excessive heat generation
- Poor cooling system
- Rough-handling/ Careless
- Aging

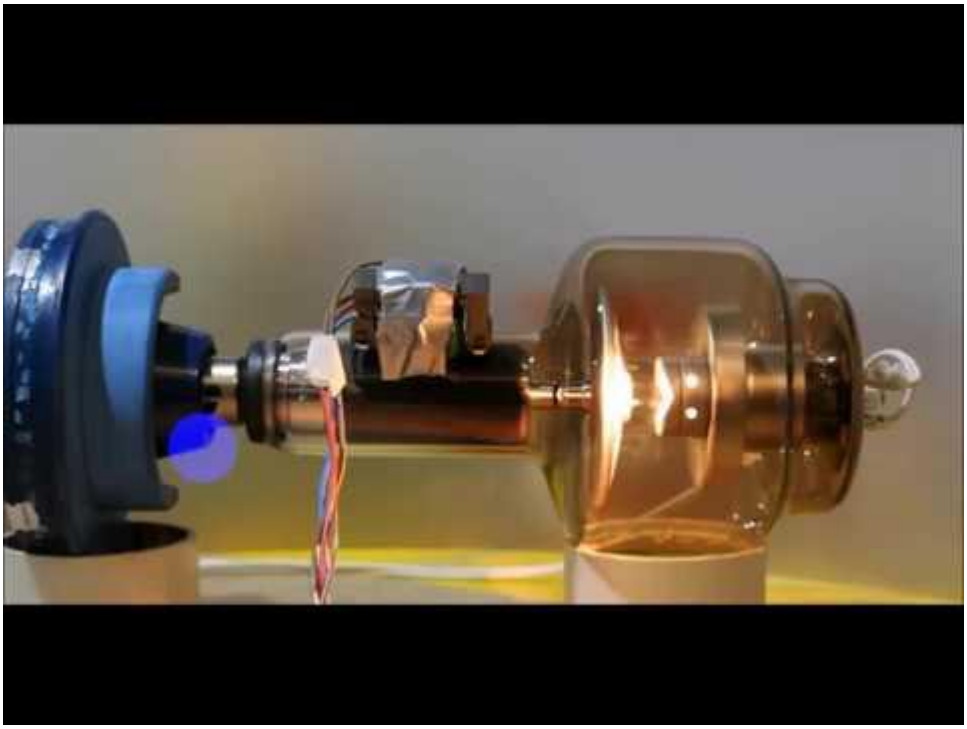

Fig (2):**Tube temperature rise**

- **Cracking of x-ray tube housing:**

Causes:

Expansion of air & oil present inside it and increased in its internal pressure

Results:

- Escape of oil from the housing.
- Insulation level & cooling rate are reduced

- **Radiation leakage**

Causes:

- Cracking of the tube housing.
- Improper shielding

Results:

- Increases patient's as well as personnel radiation dose.
- Should not exceed 100 mR/hr

- **Remedy:**

- Proper shielding should be done.
- Replace the tube with new one as soon as possible.

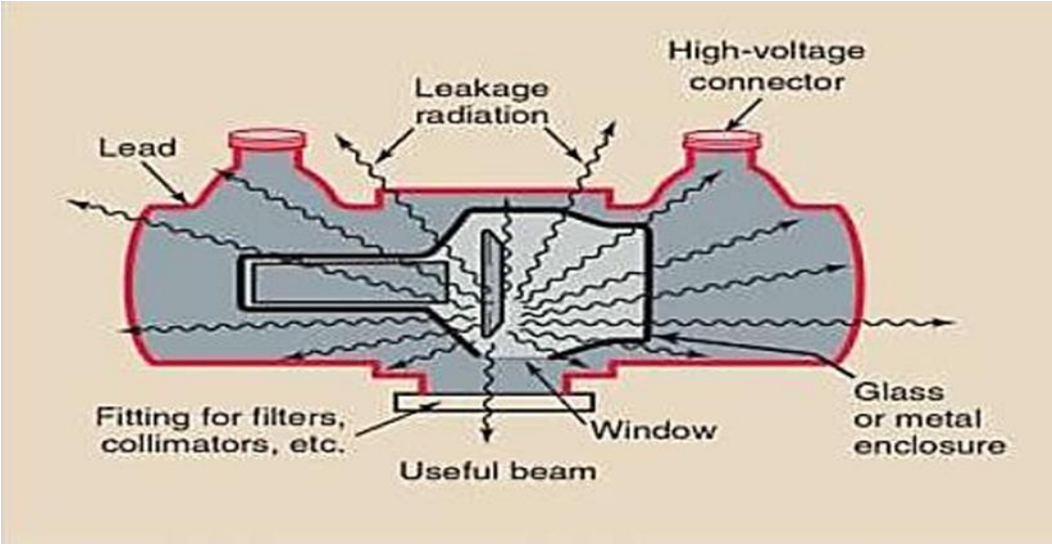

Fig (3): The shape of the radiation coming out of the tube

- **FAULTS IN GLASS/METAL ENVELOPE (Loss of vacuum).**

Causes

- Crazing of the glass enclosure due to difference in coefficients of expansion of glass and metal.

Results

- Production of secondary electrons
- Result in the variation in the number, reduced speed of electrons impinging on the target, energy of x-ray produced
- Production couldn't be controlled independently.

Remedy

Use of special alloys having the same coefficients of linear expansion as Pyrex glass is used.