

Q.A. Collectible

*Sponsored by the CRCPD's Committee on Quality Assurance
in Diagnostic X-Ray (H-7)*

Tube Warm-Up and the On-Off Question

State surveyors sometimes are asked by x-ray operators whether or not the x-ray machine should be warmed up before patient radiographs are taken, for example, in the morning. In addition, some x-ray operators leave the x-ray machine on between exposures, while others turn off main power between exposures. What is the best advice to give? First look for guidance and/or recommendations in the operator's manual or ask the installer or service engineer.

Tube Warm-up?

If the selected x-ray exposure technique will require a high mA (400 or higher), and the x-ray machine has not been used within the last two hours, then a tube warm-up procedure should be performed to prolong tube life. If the user's manual does not have recommended warm-up techniques, use a low mA (50 for the small focal spot or 100 for the large), low kVp (60-70) and a long exposure time (2 seconds). This procedure will heat the anode uniformly so that higher subsequent exposures will not damage it.

On or Off?

When an x-ray machine is left on, a small current is maintained in the filament of the cathode. When the exposure "prep" or rotor switch is depressed, a much higher current is applied to the cathode, causing it to glow brightly and supplying the electrons needed for the generation of x-rays. Generally speaking, modern x-ray generators with solid-state components can be left on during the day between uses. In fact, many service engineers feel that fewer component failures occur when this is done. Older machines, however, may benefit in prolonged life if the main power is shut off between exposures. The x-ray operator should be reminded, however, to warm up the tube again if several hours have passed between exposures.

One of the best methods of prolonging x-ray tube life (due to reducing sublimation of tungsten from the filament) is to instruct the x-ray operator to keep the time spent with the rotor moving ("prep" time) to the minimum required. This is excellent advice for state surveyors, too.

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