ALL ABOUT LAMP LIFE . . .

When considering the subject of "lamp life" we first need to understand the meaning of the word "life".

All arc discharge lamps (including low pressure and high pressure tanning lamps) have two different kinds of identifiable and measurable "lives".

One is the electrical or physical life of the lamp. At some point in time, lamps will stop working. The industry term is NEOL, or normal end-of-life. The more commonly used term is 'burn-out'.

The point in time at which lamp failure (burn-out) occurs is directly related to the number of starts per hour of operating use that the lamp is subjected to. To illustrate:

- if a standard 100w high-output (HO) tanning lamp were started only once every three hours of operation, average physical or electrical life would be about 9,000 hours!

- if the same lamp were to be turned on and run continually, 24 hours per day, 365 days per year, that lamp would have an average life in the range of 17,000 hours. So by not subjecting the lamp to the 'abuse' of starting every three hours, lamp life is almost doubled.

So, what happens when we increase the number of starts from 1 to 9 or 12 or 18 every three hours? If you said it shortens the physical life of the lamp, you are right. Note the choice of 9, 12, and 18. A 20 minute bed requires the lamps to start 9 times in three hours; a 15 minute bed means 12 starts every three hours, and a 10 minute bed equals 18 starts every three hours. The decrease in lamp life that attends frequent starting is as dramatic as the increase we see when the lamp is run continuously (without repeated starts).

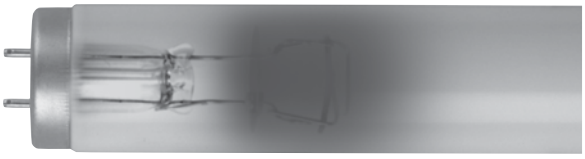
Our physical life projections under frequent start operations are:

START SCHEDULE	PROJECTED LIFE
20 minutes/start	4,500 hours
15 minuntes/start	3,000 hours
10 minutes/start	2,000 hours

Understanding why this occurs requires a modest understanding of discharge lamps and the starting process (see our technical paper: Low Pressure Lamp Starters).

Discharge lamps are constructed with coils or cathodes at opposing ends of the lamp. These coils are usually made from tungsten and they are coated with an electron-emissive material. During the starting process, power is applied to these coils and they quickly become incandescent, during which time they freely emit electrons into the gas filled tube of the lamp. This ionizes the gas fill, making it a good conductor of electricity. Within a second or so, a pulse of voltage strikes the arc in the lamp.

This pulse of energy has the undesirable effect of vaporizing small amounts of the emissive material. The vaporized emissive materials are often deposited on the inner wall of the tube, near the coil. This creates the phenomenon we know as "end-blackening".



When all of the emissive coating is depleted, the cathodes (coils) are no longer capable of generating an electron flow, and the lamp is no longer able to start (it is "burned out").

There are other conditions that can further reduce the (physical) life of a lamp. High temperature conditions in a bed, high voltage operation, high current ballasts, and the use of glo-bottle starters will all affect physical life. When low pressure lamps are driven by choke ballasts, a 'starter' is incorporated into every lamp circuit. The type of starter (glo-bottle or electronic) will have great bearing on the life of lamps . . . and here the electronic-starter (COSMOSTART/E™) does the most to preserve lamp life.

But, even under the worst operating conditions, we do not replace many tanning lamps because they burn out. This brings us to the second kind of lamp life - "usable life".

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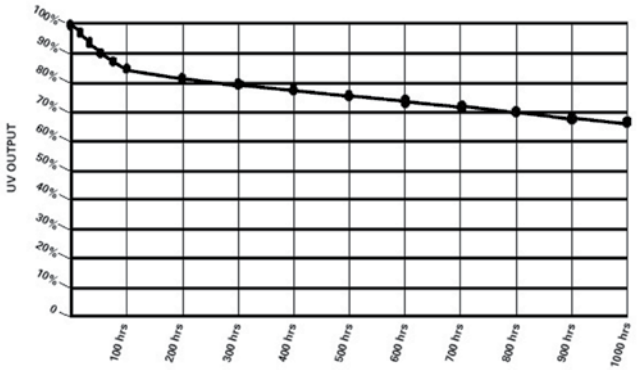
Tanning lamps reach the end of their "usable life" much sooner than they reach the end of their physical life when UV output has declined to a point where an effective tan cannot be obtained, even at maximum timer interval. In other words, the lamp still lights, but it has lost its tanning effectiveness.

All gas discharge lamps, and this includes general lighting as well as tanning lamps, depreciate in output as they are operated.

It should be noted that these lamps do not lose or gain potency as they sit on the shelf. In other words, they have neither the characteristics of bread (which becomes stale) nor brandy (which improves with age). A lamp that has been sitting on the shelf for 20 years will be just as strong and effective as the same model produced yesterday.

As lamps run, they age; their output is measured at progressive time intervals and the information is plotted on a chart. This creates what the industry calls a "maintenance or depreciation curve".

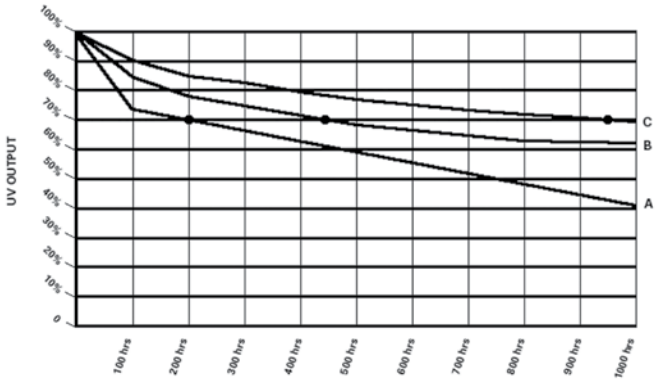


What is immediately apparent is the decline in output does not track in a straight linear path. The greatest decline takes place in about the first 100 hours. After the 100 hours, the rate of decline becomes less; there is a flattening out of the curve, but the decline in output still continues as the lamp burns. Although we call this a "maintenance curve" it is an imaginative stretch to call it a curve; the shape is more like a hockey stick.

Although the 'curve' for all lamps is somewhat similar, there are some distinct differences between different lamp models and lamps from different producers.

Why lamps have such marked differences in maintenance performance is influenced by numerous factors. But some major determinants are: stability of the transmissiveness of the glass, the inherent maintenance properties of the base phosphor and the beneficial effects provided by coatings that are applied to the phosphor materials.

The lamp manufacturing process also impacts UV maintenance. Things such as: glass preparation, baking temperatures, elimination of contaminants, and precise control of the gas and mercury additives all will have bearing on the rate and extent of UV decline. In Figure C we show three different lamps, although the 'curves' for all three are shape-similar, the three lamps are quite different.



Lamp "A" loses 25% of its initial output in the first 100 hours and is down to 70% of initial output after only 200 hours of use. While this particular lamp may not have a place in a professional salon, it might be an acceptable lamp for use in a 'home' bed, particularly if it has a low cost.

Lamp "B" has better performance characteristics than "A". "B" loses about 15% of its initial output in the first 100 hours and is down to 70% at about 500 hours. A large percentage of lamps sold annually have these performance characteristics. This style of lamp, one that declines 15% in the first 100 hours and is at 70% of initial at 500 hours, is used to some extent in professional salons, in particular, those salons that market frequent lamp changes. They are used in facilities (such as hair and nail salons) where tanning is not the primary service. There are some salon owners who use this grade of lamp

as a 'summer' lamp. These owners install Lamp B (a less expensive, 500 hour lamp) at the end of the tanning season when the lamps that served them through the busy months are UV depleted. This re-lamp carries them through the summer, fall and early winter, at which time they re-lamp with an extended maintenance product - a lamp that has improved performance characteristics greater than Lamp "B", i.e. Lamp "C".

Lamp "C" has the profile of a true "professional" lamp - where at 100 hours UV production had depleted only +/- 10% and is at 70% of its original output at 800 or 1,000 hours. Incidentally, the rate and extent of UV decline can be tracked and plotted by any salon owner with surprising accuracy by using an inexpensive hand-held radiometer. You will note continued reference to 70% of initial as a point where the lamp has reached the end of usable life. This is really an arbitrary number that the tanning industry has settled upon over the years. Certain locations that provide tanning services run lamps to below 70% before re-lamping, while other upscale professional locations re-lamp well before the lamps have declined to 70% of initial output.

The key to success is understanding your particular clientele, and re-lamping before your customers complain about poor tanning results caused by UV depleted lamps.

To learn more about tanning lamps, ballasts, starters, UV% and other topics, visit our web site at www.cosmedico.com