



UV LAMP MAINTENANCE

Most manufacturers say that a lamp's average life span is 1000 hours, plus or minus 200 hours. Some substrates require 100% output from the lamps for printed images to cure properly. Frequent job runs on such materials may reduce the effective life of the UV lamps. Conversely, high-volume work with less demanding substrates, such as fabrics and papers, can prolong the usefulness of the curing lamps because they may not require that the lamps be operated at full power. In such cases, a simple hour measurement isn't sufficient. Periodic UV measurement using a radiometer would give a more accurate representation of a UV lamp's output and available "life."

When a radiometer indicates a problem, it can be with the lamp, the reflectors, the UV filters (if present), or something emanating from the power supply. Checking these components can generally be done by a simple visual inspection, but preventive maintenance would render even this inspection unnecessary. Preventative maintenance avoids unnecessary downtime because performing this inspection would require the lamps to cool down for a long time before they can be inspected and then restarted. This could mean more than an hour of production time lost unnecessarily.

Lamps have a finite life in which to deliver required dose levels. Lamps beyond this life (and those with a dirty lens) will deliver a reduced dose. Lamps may seem to be functioning correctly after 1000 hours because deterioration occurs gradually. Lamps will ultimately fail if they're not replaced. A hazy or cloudy area in the center of the lamp is sure sign of complete failure.

Lamp maintenance must consider several variables. These variables will determine how frequently the lamps should be changed or inspected. The production usage or "time on" will have an effect on the lamp life. Most UV curing units have meters which measure the length of time that has accumulated. This time does not reflect high power versus low power but only when current has passed through the lamp. In order to properly track lamp degradation, a maintenance log must be kept regarding the use and performance of each lamp. Lamp suppliers usually have a pro-rated guarantee which is valuable if the lamp dies soon after purchase. Proper record keeping will verify the fact that a new lamp was defective.

Quantifying lamp output may be unnecessary if you simply monitor hours of lamp operation and stick to the manufacturer's lamp-replacement guidelines. But you still need to take steps to optimize lamp life. One way is to make sure the lamps are idle when the printer is not in use. The printer's operating software, which allows you to vary lamp intensity to best match the substrate with which you're working, may enable you to select the time of inactivity that must elapse before the printer automatically powers down its curing system (also known as sleep mode).

Precise workflow management is another way to make lamps last longer. Keeping the lamps powered up and in use once they're activated is more effective in terms of longevity than switching them on and off throughout the day. Every strike of the lamp degrades it faster than just pure runtime. If you want to get the longest lamp life, you need to queue your jobs in your RIP to make sure the printer is constantly fed.



Keeping UV lamps cool also helps to prolong their life. Heat generated in the UV-curing assembly is managed by air flow generated by fans or blowers. The quartz plate that protects the curing assembly must be tended to routinely. Ink overspray, dust, and other substances will otherwise accumulate on the plate and cause UV and IR light to actually reflect back into the assembly, creating excessive amounts of heat. Very large UV lamps will sometimes sag in the middle as a result of the heat generated by the lamp during operation. The extra large size of the lamp will cause the lamp to be out of focus as the overall distance between the lamp and the reflectors will have changed. This will show up only in the middle of the exposure area and should also be periodically checked with a radiometer.

Lamp maintenance must also consider the fact that the spectral output may change over a period of time. This means it is possible for a lamp to be on without it producing the proper energy to effectively cure a reactive ink or coating. The change in spectral output is a variable that should be monitored, since the result can be products produced with uncured or partially cured inks or coatings. This problem is hard to detect, yet quite troublesome when the spectral change produces only a slight change in the cure. A small change may only affect the coating's physical properties, such as adhesion, intercoat adhesion, or long-term effects associated with outdoor weatherability or embrittling. These slight changes could produce enormous problems that don't make themselves known until after the end product is in the customer's hands. A critical goal of a preventative maintenance program is to catch changes in spectral output before they become a problem.

There are other problems associated with UV lamps which have an effect on the processing but are not as critical as the ones already discussed. During the installation of the lamp and cleaning of the reflectors, it is possible to get foreign matter on the lamp. This will have an effect on the transmission of light. The oil from a fingerprint will etch itself into the quartz, presenting problems. First, the etched area will not transmit light as a clear section of the lamp. This may not appear to be significant on a large lamp, but a one-inch fingerprint is a big percentage of a 12-inch lamp. In addition to a reduction of light transmission, the area etched will weaken the quartz itself and increase the possibility of breakage. This is especially of concern for lamps which operate at high pressures, such as capillary lamps. This breakage may occur during the machine's operation or even while handling.

Dirt collects on the lamp from other sources as well. It is recommended that lamps be cleaned before installation to ensure there is nothing on the quartz. A soft, lintless wipe-- such as the Webril Hand Pads (J006-030), wetted with Lamp/Reflector Cleaning Solution (A002-019) should be used. If the cloth is not clean or an improper cleaning solution is used, a thin film of foreign matter may accidentally be applied to the lamp. When the lamp is later used, the lamp's heat will slowly darken the thin film on the surface. This darkening will, over time, reduce the amount of UV energy that will be transmitted and effect the cure of the ink or coating. This problem would be detected by a radiometer, as well as by periodic inspections.