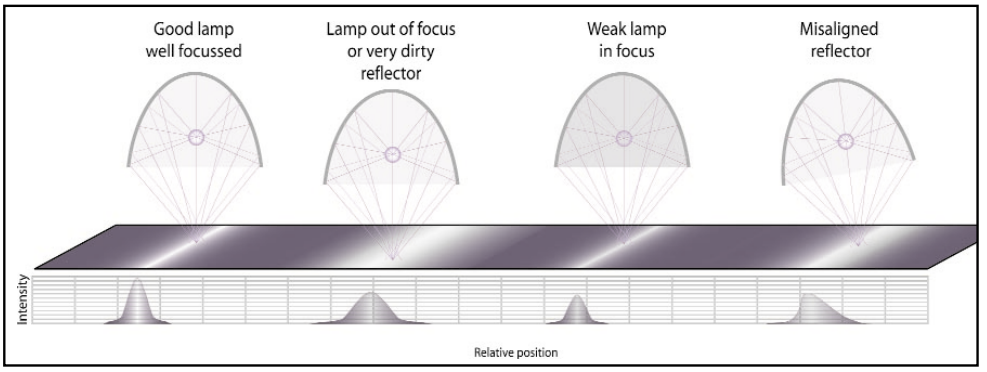
# UV/EB Corner

## Using Radiometric Tools to Monitor Critical Parameters

*Editor's Note: UV/EB Corner, a new feature created in conjunction with RadTech and written by its members, highlights what's new and exciting in the field of graphic arts.*

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The curing mechanism for UV inks is different from solvent-based products. Successful control of curing and "oven" maintenance require radiometric, light measurement tools. What are the parameters to be measured, and what are the "best" tools for the job?

The outcome depends largely on the illumination dynamics in the curing system, i.e. did enough light of the right wavelength strike the ink and did it penetrate to a sufficient depth to cure the entire thickness. Ideally an ink manufacturer might write a working specification like: "Expose this product to 600mJ/cm$^2$ of 340nm radiation at an irradiance level of 1.5W/cm$^2$." The 600mJ/cm$^2$ specifies the total energy or exposure per cm$^2$ required. The 340nm is the wavelength of light that changes the ink's properties and the 1.5mW/cm$^2$ is the irradiance or intensity needed to penetrate the typical working thickness of the ink.

Which radiometric tools provide sufficient information to correctly monitor these parameters?

A spectroradiometer will provide the irradiance of a lamp at every wavelength. With this you could accurately track the irradiance of a lamp at the precise wavelength that cures the ink. However, spectroradiometers typically can not stand the rigors of passing through an oven, and therefore lack the ability to monitor the exposure. However, with foreknowledge of the activation wavelength of the ink and the spectral distribution curves provided by the lamp manufacturer, a lamp with its primary output near to the optimum wavelength required can be specified.

Using a radiometer with filtration to look only at a small part of the lamp's output surrounding that wavelength would provide enough specificity for successful monitoring of the exposure at the required wavelength. There are many suppliers that provide radiometers that will measure the total exposure (J/cm$^2$) and the maximum irradiance (W/cm$^2$).

Are these two pieces of information sufficient? In a single lamp system, usually yes. In a multiple lamp system, not really. Imagine a three lamp system. Suppose that one of the lamps has reduced irradiance due to reflector defocus or misalignment, dirt or age. With a radiometer that provides only energy and maximum irradiance, it might seem reasonable to slow down the line to achieve the correct exposure. However, the ink may fail to fully cure due to insufficient UV depth penetration over the entire curing path. The radiometer does not provide all of the information to correctly assess the uniformity of the irradiance.

One approach for avoiding this situation is to, on a systematic basis, send the radiometer through the oven with only one lamp illuminated at a time. In that way, any reduction can be identified and linked to a specific lamp. Another, even more informative way of monitoring the optics in the oven would be to use a profiling radiometer that need only be run through the oven once. Not only would it indicate whether or not the lamps are up to specification, the shape of the profile could also indicate the probable cause for the reduction. A profiling radiometer with a correctly chosen filter would therefore allow the accurate monitoring of all three of the critical parameters at all points along the curing path. ■

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