Bright Spots on the Horizon—UV LED and Inkjet Graphics Printing

By Dan Marx

At the Specialty Graphic Imaging Association's recent show for the graphics communications industry (October 2007), a new product announcement by a little-known company from Russia marked a new and exciting change in UV-curable inkjet technology. The company, Sun LLC, launched the NEO light emitting diode (LED) UV, which for the graphic communication industry is the first commercially available UV-inkjet printer offering full LED curing.

Discussion of this technology has long been rumored in segments of the printing industry, where UV inkjet has become commonplace. Prior to this point, however, LED has been used only as a way to spot cure the ink, and thus halt the expansion of the printed dot. This new system takes LED curing all the way, fully curing the ink. The implications of LED UV-curing systems offer unique possibilities for inkjet users.

What's the Big Deal?

So what's the news here, other than the fact that a new type of light source is being used to cure UV ink? What's the fuss, you might say? The possibilities that are inherent with LED curing offer interesting developments for the imaging equipment graphics producers, who are likely to buy in both the near and far future. Granted, the technology currently offered has yet to be fully proven within the diverse needs of the printing industry, and one hopes the machine currently offered is more than a step or two past beta, but that's not really the point.

The real point is that the use of LED curing offers some distinct advantages over the lamp systems currently used to cure UV-inkjet ink. The first advantage is that LED offers curing with little or no heat. This is particularly useful in situations where the media used (for example, thin films) are subject to softening or distortion resulting from traditional "hot"-curing systems. The "cold" light of LED could eliminate these concerns, thus allowing users of UV-inkjet technology the ability to print on an even wider variety of media products than they currently can.

Next, LED curing allows for a much less weighty assembly for the light source. If you look at many of today's larger UV-curable inkjet machines, you will notice that the assembly housing the heads and the lamps is quite large, allowing space for not only the heads and lamps, but also fans to cool the lamps, and a variety of electrical elements to power the curing system and ensure effective curing. Using an LED-curing system, much less machine "structure" is needed, which could ultimately result in lighter machines with a lighter structure and fewer essential parts. This is because the LED arrays are comparatively light—and again, offer cold light, eliminating the need for whirring fans and bulky lamps. This means that fewer and lighter mechanical systems can be

used to shuttle the inkjet heads across the media (and cure it while it goes). In theory, this could also mean lower equipment cost, more compact equipment manufacturing, and a reduced shipping cost for the machine.

Unique Benefits

The LED-curing unit itself also offers unique opportunities to shake up the UV-inkjet status quo. First, LED arrays use drastically less electricity to effectively cure the ink. As an example, a 14-inch long LED UV-curing array requires only 240 watts of power while traditional lamp systems use a full 400 watts per linear inch of curing or 5,600 watts for 14 inches. The result for a company running UV-curable inkjet, perhaps on a number of machines, 24/7 could be a significant savings in electrical costs, perhaps effecting both profit and competitiveness. Early word on these systems also reports a significantly longer lamp life between 4.5-11 years of continuous operation, running a full 24 hours per day. What this means is that the LED arrays may actually surpass the expected obsolescence date of the machine itself, essentially eliminating the need for periodic replacement of the arrays. This would be the equivalent of owning a car that needs no oil changes for at least 300,000 miles. On today's systems, periodic lamp replacement can be a costly and necessary maintenance procedure, much like brake overhauls on your automobile. Under continuous use, UV-lamp replacements can also be frequent, significantly adding to a machine's total cost.

Another potential advantage of the new LED-UV system is the almost instanteous warm-up of the system, whereas traditional UV lamps can require several minutes before they can be relied upon to fully and completely cure the ink. This allows for broader production availability for the machine and a reduced need to keep the bulbs running between jobs.

One Challenge

One of the main challenges facing LED-UV technology is the significant lack of availability in ink choices for those using the technology. Because much of the research and development performed on UV-curable inkjet has focused on the use of traditional bulb systems, it will take some time for ink manufacturers to develop and market viable and affordable inks for LED systems. This can be seen as a temporary hurdle in the ongoing development of UV inkjet in general, but not a stopping point for new development.

Summary

The longer-term possibility for LED-UV systems, after the technology has had a chance to "mainstream" itself, may be a lower total equipment cost over today's traditional UV systems. The savings would come from reduced equipment build structure, coupled with lower electrical bills and less frequent lamp replacement. This is contingent, of course, on the technology producing for the long-term what it promises us today.

For now, look for LED-UV technology to make a showing in the graphic communications industry, and follow the technology as it reaches "prime time." ◗

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