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# Revisiting electronic ink

ELECTRONIC INK HAS CHANGED IN THE SEVEN YEARS SINCE WE LAST TOOK A LOOK AT IT.

When EDN looked at electronic ink seven years ago, there were two visible commercial approaches to delivering display information. E Ink's ([www.eink.com](http://www.eink.com)) approach has made the larger visible move from the lab to product within the last three years as a display technology; however, the underlying approach has changed somewhat. The approach remains fundamentally the same except that the millions of microcapsules, with a 50-micron diameter arranged in a honeycomb structure, now hold a clear fluid instead of a colored oil, and it employs a two-pigment particle method instead of a single-pigment particle method suspended in the fluid to display information.

The electronic-ink film consists of millions of microcapsules arranged in a honeycomblike structure. When you magnify the structure, you can see the microcapsules and how the pigment fragments do not have to align on a one-to-one basis with the microcapsules to form images. The addressing backplane rather than the size of the microcapsules limits the dot-per-inch resolution.

Electronic ink has moved into the e-book market. Although the electronic-ink film is flexible, current e-books are implementing a rigid display with a glass cover for physical protection and as many as seven layers of coating for ultra-violet protection of the display.

Electronic ink supports small and low-power displays, such as for USB flash disks and wrist watches.

The pigment fragments within each microcapsule move independently based on the polarity of the charge on the addressing electrodes that sandwich the electronic-ink film. Higher voltages, such as 15V on the electrodes, result in faster movement of the pigment fragments for refresh rates of 250 msec. Lower voltages would require slower refresh rates to allow the pigment fragments to fully shuttle through the microcapsule fluid. When the addressing electrodes are powered off, the pigment fragments maintain their position within the microcapsule for up to a year without consuming any more power in the system.

