

# MONITORS - LCD VS CRT

As the technology has improved and the prices have come down, LCD (Liquid Crystal Display) monitors have rapidly been replacing CRT (Cathode Ray Tube) monitors on desktops around the world. ComputerWorld first reported that LCD sales would surpass CRT sales for the first time in 2003, a lead that it didn't hold for good. But according to DisplaySearch, a flat panel display market research and consulting company, the sales of LCD monitors regained the lead over CRT sales in the third quarter of 2004, a lead that it should eventually hold for good.

The question is why choose LCD over CRT? There are several pros and cons to consider, and the few items listed below will be considered in this Geek Tip.

- Price
- Size
- Image Quality
- Energy Consumption
- Personal Comfort
- Response Time

## **Price**

The price of LCD monitors is much lower than a few years (or even months) ago, but still far exceeds the price of a comparable CRT monitor. For example, I spent about \$600 (US) on a

Viewsonic VA-720 17" LCD monitor in early 2003, and see that the same model now sells for less than \$300. A significant price drop, but in comparison a 17" Viewsonic CRT monitor can currently be purchased for less than \$100. The ratio of prices may have narrowed from about 5:1 to 3:1, but the aging technology behind CRTs still allows it to hold the lead.

You can't even compare prices of CRTs to LCDs in CompGeeksmonitor section as they are right in step with the sales information provided above, and now only carry LCD monitors. Prices vary, even among LCD monitors of the same screen size, so there has to be something more to it than price.

## **Size**

One reason that LCDs have gained in popularity is because of their small foot print. The overall size and weight of CRT monitors far exceeds that of LCD monitors. CRTs share the same image processing technology with tube televisions, and therefore share the same bulky style of housing. For example, the manufacturer's web page lists this ACER 19" LCD monitor as having a depth of a mere 6.9" (including the base) and a weight of 12.1 pounds. As a point of reference, a 19" ACER CRT is significantly larger with a depth of 16.86" and a hefty weight of 46.31 pounds.

Desktop real estate is precious, and an LCD will require only a small fraction of the depth that a CRT would require. And if there isn't even enough room on your desk for a slim LCD monitor, the low weight makes them perfectly adaptable to be hung on the wall, or off of a radial arm mount, such as this one from Office Innovations.

## Image Quality



Image quality is generally considered to be better on an LCD, as each pixel is generated by a specific set of transistors in the screen, which produces a crisp image. But some features that fall under the general heading of image quality might not favor an LCD, including viewing angle, brightness, and contrast.

Early LCD monitors had a fairly narrow viewing angle that made clearly seeing the screen from anywhere but directly in front of it difficult. This has improved greatly, but still doesn't quite rival the viewing angle of CRTs which provide the same picture quality regardless of the angle. A monitor with a maximum vertical viewing angle of 120 degrees should not be hard to find at this point, with many monitors now being able to provide an even greater angle.

Brightness is an area that LCD monitors may have the edge over CRTs, but it varies widely from unit to unit. The standard measure for brightness is referred to as "nits", which have units of  $\text{cd/m}^2$  (candelas per square meter), where a higher number is better. Looking at the three 17" LCD monitors currently available from [geeks.com](http://geeks.com) as examples shows two with brightness specifications of  $400 \text{ cd/m}^2$  and one with a brightness specification of  $250 \text{ cd/m}^2$ . As a comparison, the typical CRT monitor may provide half the brightness of an LCD, as confirmed at Viewsonic's Monitor University.

Contrast is similar to brightness in the fact that it varies widely from unit to unit, and is a specification where a higher number is desired. The contrast is represented as a ratio, where higher numbers imply that bright colors can be displayed next to dark colors without them

appearing washed out. Monitors with lower numbers in the ratio may also result in dark shades being displayed as just black, and any detail in these areas may be lost. As a point of reference, CRT monitors may have contrast ratios around 700:1, and using the three 17" LCD monitors currently available from geeks.com as examples shows two with contrast ratios of 450:1 and one with a contrast ratio of 400:1. 400:1 and 450:1 are quite respectable values for LCD monitors, but CRTs may still have the edge in this department.

### **Energy Consumption**

LCD monitors definitely hold the edge over CRT monitors when it comes to being energy efficient. The huge tube in a CRT monitor is the source of most of its energy consumption, and a comparably sized LCD may use just a fraction of the electricity. Taking a look at this 19" Jetway LCD monitor shows that it consumes 48 Watts during normal operation, which is less than your typical light bulb. In contrast, a 19" CRT such as this one from Viewsonic may draw up to 160 Watts. Therefore the fraction of electricity used in this case is 3/10, and could translate to noticeable savings on your electric bill.

### **Personal Health and Comfort**

The main benefit that LCDs have when it comes to comfort is the reduced strain on your eyes. The reduced glare on the screen's surface, and the elimination of a typical CRT's "refresh", can prevent your eyes from getting tired from extended use. A CRT monitor redraws the image on the entire screen as it refreshes, whereas an LCD monitor only changes the necessary pixels during a refresh.



There may also be the unquantifiable effect of reduced electromagnetic emissions on LCD monitors. The exact impact of electromagnetic emissions may not be fully understood, but in general less is considered to be better, as addressed in this article. And, your back may also appreciate an LCD when it comes time to move, as the example above shows a 19" LCD monitor weighs about ¼ as much as its CRT counterpart.

### **Response Time**

The transistors that create the image on a TFT LCD can be a bottleneck to its performance, especially in fast paced 3D games where speed is critical. Related to the different approach taken with screen refreshes, the amount of time it takes the pixels to change in order to display the new image is referred to as the response time. If the response time is too slow, one may experience blurred images or ghost effects where the previous image is still slightly visible with the new image.

LCD monitor response times have greatly improved over the past few years, and many LCDs are now fast enough to consider for serious 3D gaming use, but specifications still vary from unit to unit. A few years ago a typical response time on an LCD monitor may have been anywhere from 30 to 50 milliseconds, and today these numbers can get down into the single digits, with anything 25 milliseconds or less being quite common (lower is definitely better). Using the three 17" LCD monitors currently available from geeks.com as examples shows two with response times of 25ms and one with a response time of 16ms.

Source: <http://www.geeks.com/techtips/2004/techtips-16dec04.htm>