The 30-inch Apple Cinema HD Display Productivity Benchmark

Measuring the impact of screen size on real-world productivity

High-quality, high-resolution displays have always been among the most expensive peripherals one could add to a personal computer. The first 21-inch CRT displays capable of displaying millions of colors were two or three times as expensive as 30-inch Apple Cinema HD Display, yet offered lower resolution than a modern 15-inch laptop computer.

Today, prices of flat-panel displays have dropped, and high-resolution displays have become much more common, even at the consumer level. Yet larger displays, such as Apple's 30-inch Cinema HD Display, have retained an aura of exclusivity and the perception that their usefulness is limited solely to high-end applications such as video production or professional image editing.

What is far less widely known, however, is that increasing the "screen real estate" might be a very good way to **boost overall productivity, even in very common tasks that have little or nothing to do with highly specialized professional applications.** Most of us will find a larger screen more comfortable to work with than a smaller one. We instinctively feel more at ease with more screen space, just as we prefer to have a larger work table rather than a small one that forces us to move things around constantly. **The salient question is, of course: Does this added comfort translate into higher productivity? To provide clear, activity-based data to answer this question was the aim of this research project.**

About this Report

This report presents key findings and benchmark data comparing Apple's 30-inch Cinema HD Display with smaller flat-panel displays. The productivity benchmarks conducted for this project **compared real-world productivity in a number of common operations, ranging from general productivity with office applications to digital imaging, as well as design and publishing**. Some of the test procedures were defined to measure productivity impact in simple operations such as editing text, formatting spreadsheets, or retouching images; others focused on interapplication integration, measuring the impact of a large display on work involving two individual programs.

This report presents key benchmark data and some return on investment (ROI) analysis based on the cumulative effect of small, incremental productivity gains over time. For more information on the benchmarks and the methodology, please see the Methodology sidebar on page 3. For the complete results, as well as a detailed discussion of the methodology and the benchmark procedures, please download the benchmark report at www.pfeifferreport.com.

Major Findings

- High-resolution displays such as the 30-inch Apple Cinema HD Display can result in **measurable productivity and efficiency gains**.

- Productivity gains were present in not only **professional design and publishing, digital imaging, and digital video**, but **also in general productivity and office applications** such as word processors and spreadsheets.

- Cumulated productivity gains linked to a large, high-resolution display **can lead to a return on investment (ROI) of several thousand dollars per year.**

About Pfeiffer Consulting

- Pfeiffer Consulting is an **independent technology research institute and consulting operation** focused on the needs of publishing, digital content production, and new media professionals.

- Download the complete **30-inch Apple Cinema HD Display Benchmark Report** at www.pfeifferreport.com.

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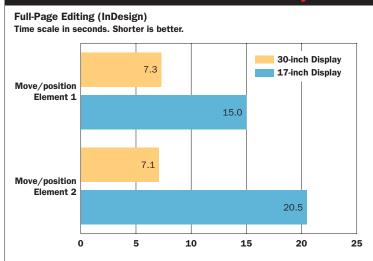# Productivity Strategies for Large-Format Displays

- Computer displays are **a widely overlooked productivity factor** of the personal computer, and they can contribute significantly to productivity, efficiency, and overall throughput.

- Productivity and efficiency gains documented in these productivity measures are present in not only digital imaging and design applications, but also in **office applications as well as in personal productivity** of the computing environment.

- A larger display area **often results in new productivity strategies** that make best use of the display in ways that one cannot easily imagine when working on a smaller display.
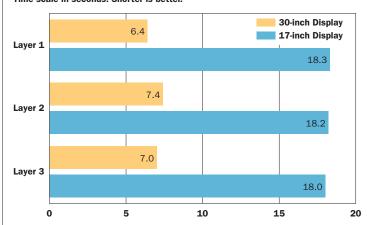
Taking Displays at Face Value

Computer displays are probably the most widely overlooked component of the modern computer. Not only is there a huge difference between a good-quality display and a lesser one, **the impact a display has on the work we do with a computer is frequently underestimated.** Most of us probably do not think of the display as a tool, yet when one compares different types and sizes of displays, the effect they can have on our way of working becomes immediately apparent. Once we have worked with a particular display for some time, we realize that we tend to adapt our way of working to its particularities.

The most important aspects of a display are, of course, the actual size and resolution; we will discuss their impact in detail below. Other aspects become apparent only over time, yet can have a strong influence on our way of working. This is the case for the overall type of illumination. Compared with TV-style cathode ray tube (CRT) displays, liquid crystal display (LCD) panels show a crisper, more stable image. **As a result, we can sit closer to an LCD screen without experiencing visual fatigue, and we tend to interact with the screen more directly.** Likewise, reading on screen tends to be more comfortable on an LCD panel than on a CRT display.

Productivity Benchmarks: Major Results

Full-Page Editing (InDesign)
Time scale in seconds. Shorter is better.

Drag and Drop Editing between Multiple Images (Photoshop)
Time scale in seconds. Shorter is better.

Professional design and publishing, as well as digital imaging, are applications that make use of every square inch of even the largest display. For a designer, the ability to view a full double-page spread at a zoom level that allows detailed, precise editing, without the need to zoom in and out provides immediate productivity gains (chart on the left). This productivity gain also applies to creative work in Photoshop: The productivity measures on the right show the time necessary to combine and position elements from two different, multi-layered Photoshop images.

This benchmark project was conducted by Pfeiffer Consulting for Apple Computer. It analyzes the productivity impact of large format displays such as the 30-inch Apple Cinema HD Display, when compared with smaller displays.

The productivity measures covered several application areas: **digital imaging, design and publishing,** as well as **general productivity.**

Productivity benchmarks were conducted using a set of specifically defined productivity measures, executed with Adobe InDesign CS2, Photoshop CS2, Illustrator CS2, Microsoft Office 2004, and QuarkXPress 6.5.

Hardware and configurations

The following displays were used for the benchmarks:

17-inch Samsung SyncMaster Display 172x, with an optimal resolution of 1280 x 1024 pixels

30-inch Apple Cinema HD Display, with an optimal resolution of 2560 x 1600 pixels

Selected benchmarks were also conducted using a **20-inch Apple Cinema Display,** with an optimal resolution of 1680 x 1050 pixels.

Benchmarks were conducted on a standard 2.7GHz Power Mac G5 equipped with 2GB of RAM.

All benchmarks were run on a **standard, unmodified installation of Mac OS X 10.4.2 Tiger.**

For complete results and descriptions of the benchmark methodology, as well as a detailed system configuration, please download the complete benchmark report from **http://www.pfeifferreport.com.**

For more information, please contact **research@pfeifferreport.com.**

Size Matters

The first thing one notices when working with a high-definition display is **how important it is to be able to see more information.** A writer will be more efficient just because he or she can see more of the text. A translator will work faster if he or she can see a full page of both the original text and of the translation next to each other, without having to shuffle document windows around.

Some of these benefits are hard to measure: Being able to see the content of three full-size web pages next to each other makes researching and comparing information much faster, yet the direct benefit would be hard to quantify.

Other aspects can be more easily measured. For instance, **in the productivity benchmarks conducted for this project, it took twice as long to combine information from a spreadsheet with a word processing document on the 17-inch display than on Apple's 30-inch CInema Display HD.** Combining and positioning image elements in Photoshop was even faster on the large display, taking almost three times longer on the 17-inch display. The smaller screen required zooming and panning the picture, while the large display could show both pictures next to each other at 100%.
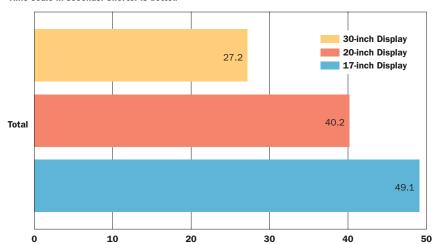
Developing Productivity Strategies for Large Displays

Large displays such as the 30-inch Apple Cinema HD Display are in fact very conducive to adapting our work methods. One example: Most modern design applications allow the user to open several windows showing different parts of the same document. On a standard display, the usefulness of this functionality is limited, since it usually means having to swap between windows that are partially hidden, thus reducing the potential productivity gains. On a 30-inch display, however, **a designer can display a double-page spread at 100% next to a full page displayed at a higher zoom level for detailed editing without any overlap,** and still have room for many open palettes. Other efficiency gains of a large display are linked to working with several applications.

With a 30-inch display, one can easily work on a large Excel spreadsheet while having a web page and an email client all open and visible at the same time. **The productivity measures presented in this report document some of these productivity gains. With the right productivity strategies, these increases in efficiency can be even more significant.**

Productivity Measures: Excel

Apply Selective Formatting in Large Spreadsheet (Excel)
Time scale in seconds. Shorter is better.

- 30-inch Display
- 20-inch Display
- 17-inch Display

Total: 27.2 / 40.2 / 49.1

Spreadsheets are among the programs that immediately benefit from a larger screen, as this chart shows. Beyond these productivity gains, just showing more information is an essential benefit of a larger display—working with a complex spreadsheet can be very difficult on a small screen.

Talking about Return on Investment

Major Points

- **Return on investment of displays needs to be considered in a different way from other computer hardware,** because of different redundancy patterns and the longer lifespans of displays compared with other computing equipment.

- Seemingly small productivity gains on frequently repeated operations **can result in a significant return on investment over time.**

- The combined productivity gains from frequently repeated operations **can lead to an ROI of several thousand dollars per year for a 30-inch display.**
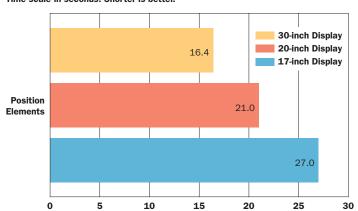
A Complex Notion

How can we evaluate the return on investment (ROI) of a peripheral such as a high-definition display? Isn't spending several thousand dollars on a peripheral extravagant, if smaller and cheaper displays can get the same job done for a significantly lower price? Can such a purchase even be justified? **Displays are difficult to judge as investments, since the payback they offer is significantly different from, say, a faster computer.** The average lifespan of a personal workstation is between three and four years. A high-quality display, on the other hand, can be used much longer, making it more reasonable to invest in a higher-quality model. LCD displays have some additional advantages over CRT monitors, since they do not show color degradation over time, which is inevitable in classic display tubes. **Even the smaller footprint of LCD displays can result in savings, particularly in larger cities where office space comes at a premium. Lower power consumption is also a cost-saver of LCD displays.**

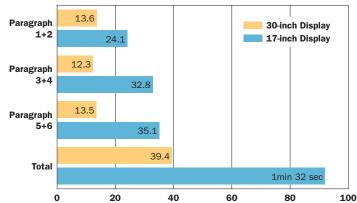## Calculating the ROI of Productivity

If there is one lesson to take away from the years of productivity benchmarking and ROI analysis that Pfeiffer Consulting has conducted, it is that **the biggest**

Productivity Benchmarks: Major Results

Fine-tuning Page Layout in QuarkXPress
Time scale in seconds. Shorter is better.

	30-inch Display	20-inch Display	17-inch Display
Position Elements	16.4	21.0	27.0

Combine Text from Multiple Documents (Word Processor)
Time scale in seconds. Shorter is better.

	30-inch Display	17-inch Display
Paragraph 1+2	13.6	24.1
Paragraph 3+4	12.3	32.8
Paragraph 5+6	13.5	35.1
Total	39.4	1min 32 sec

On a smaller display, the tasks involved in fine-tuning a page layout include repetitive scrolling and panning of the document, slowing down the design process. The chart on the left shows the time necessary to move two graphic elements on a double-page spread from one page to the other and position them precisely. On the 30-inch display, it is possible to produce the same result in

almost half the time required on the smaller display. The chart on the right shows details from a productivity measure comparing the time required to combine text elements from two files in a new word processing document. The whole process, which required more than one and a half minutes on a 17-inch display, could be completed in less than 40 seconds on the 30-inch display.

overall productivity gains result from sometimes seemingly imperceptible productivity increases in frequently repeated operations. A good example is the necessity on smaller displays to repeatedly display and hide palettes in graphics applications such as Photoshop or InDesign. In the efficiency measures for this project, the 30-inch display allowed for a productivity gain of almost 10 seconds over a 17-inch display in this operation. Repeated 100 times, this operation alone has saved a designer more than $26, based on an hourly rate of $100. For a creative director charging $300 per hour, the savings for this operation alone would be close to $80.

Return on Investment—and Beyond

The table below simulates the return on investment of some of the operations measured in this project. Individually, the productivity gains may seem almost imperceptible. **Cumulated over time they can result in an ROI of thousands of dollars per year.** Yet these figures do not cover one of the most notable benefits of high-definition displays: The more we see, the more productive we are.

The most important lesson from these productivity measures is not how much faster we work using a big display, but to what extent smaller displays slow us down. **The question is: Can we afford to be slowed down in our work?**

ROI Simulations: Can a 30-inch Display Pay for Itself?

Incremental Productivity Gains (Return on Investment generated by individual operation)	Productivity on 17-inch display (Time in seconds)	Productivity on 30-inch display (Time in seconds)	Time saved using a 30-inch display (seconds)	Prod. gain (%)	ROI generated (1 hour@$100)	ROI generated (1 hour@$200)	ROI generated (1 hour@$300)	ROI generated (1 hour@$400)
Moving Files Between Folders (Finder)	29.3	15.7	**13.63**	**46.45%**	$0.38	$0.76	$1.14	$1.51
Cleaning Up Digital Pictures	52.3	25.8	**26.53**	**50.73%**	$0.74	$1.47	$2.21	$2.95
Check High-Res Image for Sharpness	27.2	7.2	**19.99**	**73.58%**	$0.56	$1.11	$1.67	$2.22
Drag and Drop Between Images	18.3	6.4	**11.93**	**65.09%**	$0.33	$0.66	$0.99	$1.33
Fine-tuning Page Layout (QuarkXPress)	27.0	16.4	**10.63**	**39.38%**	$0.30	$0.59	$0.89	$1.18
Switching Palettes (InDesign)	23.7	14.2	**9.50**	**40.08%**	$0.26	$0.53	$0.79	$1.06
Full-Page Editing (InDesign)	20.5	7.1	**13.37**	**65.20%**	$0.37	$0.74	$1.11	$1.49
Application Integration (Word/Excel)	34.5	17.0	**17.48**	**50.65%**	$0.49	$0.97	$1.46	$1.94
Combine Cells from Spreadsheets	42.6	20.7	**21.85**	**51.31%**	$0.61	$1.21	$1.82	$2.43
Cut/Paste Cells in Large Spreadsheet	24.9	10.9	**13.96**	**56.05%**	$0.39	$0.78	$1.16	$1.55
ROI projections based on incremental productivity gains	**Time saved (seconds)**	**Number of occurrences/week**			**ROI gener. (1 hour @$100)**	**ROI gener. (1 hour @$200)**	**ROI gener. (1 hour @$300)**	**ROI gener. (1 hour @$400)**
Moving Files Between Folders (Finder)	13.63	50			$18.93	$37.85	$56.78	$75.70
Cleaning Up Digital Pictures	26.53	10			$7.37	$14.74	$22.11	$29.48
Check High-Res Image for Sharpness	19.99	20			$11.11	$22.21	$33.32	$44.42
Drag and Drop Between Images	11.93	50			$16.57	$33.15	$49.72	$66.30
Fine-tuning Page Layout (QuarkXPress)	10.63	30			$8.86	$17.72	$26.58	$35.44
Switching Palettes (InDesign)	9.50	100			$26.39	$52.78	$79.17	$105.56
Full-Page Editing (InDesign)	13.37	50			$18.56	$37.13	$55.69	$74.26
Application Integration (Word/Excel)	17.48	20			$9.71	$19.43	$29.14	$38.85
Combine Cells from Spreadsheets	21.85	20			$12.14	$24.28	$36.42	$48.56
Cut/Paste Cells in Large Spreadsheet	13.96	10			$3.88	$7.75	$11.63	$15.51
		Total ROI generated/week			**$133.52**	**$267.04**	**$400.56**	**$534.09**
		Total ROI generated/month			**$534.09**	**$1,068.17**	**$1,602.26**	**$2,136.34**
		Total ROI generated/year			**$5,874.94**	**$11,749.87**	**$17,624.81**	**$23,499.75**

The 30-inch Apple Cinema HD Display Productivity Benchmark

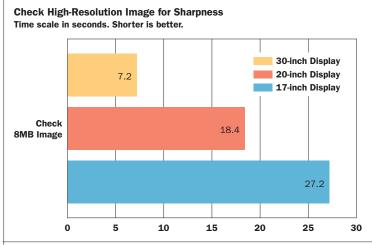# Do Productivity Gains Scale with the Size of the Display?

Major Points

- The Productivity Measures conducted for this project show that **productivity gains increase with the size of the display.**

- Efficiency gains are present in **general office applications** such as spreadsheets and word processors as well as **digital imaging and design applications.**

- **Being able to see much more information simultaneously is a considerable perceived advantage** of larger displays in most areas of personal productivity.

Is Bigger Better?

Some of the productivity measures for this research project were conducted not only on the 17-inch and the 30-inch display, but also on a 20-inch Apple Cinema Display offering an optimal resolution of 1680 x 1050 pixels. The conclusion of these tests is clear: a 20-inch display offers clear productivity advantages over the smaller model, yet lags behind the 30-inch display. This conclusion is confirmed in practically all the tests conducted on all three displays. (Please refer to the **30-inch Apple Cinema HD Display Benchmark Report** for more results).
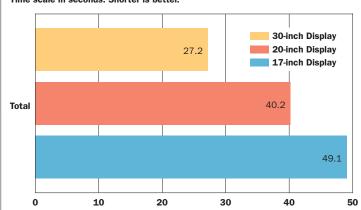
The reason why the 30-inch display increases productivity over both smaller displays is simple: **When working on a computer, we lose much more time than we realize through user-interface manipulations.** Not unlike the need for a large surface when we are organizing papers, a display that eliminates the need to shuffle windows, to open and close palettes, or to zoom in and out in order to switch between detail and overview will increase our productivity. A 20-inch display, therefore, has an advantage over the smaller display, yet cannot compete with the 30-inch display in terms of productivity. Interestingly, these productivity gains concern not only graphic designers and photographers: Anybody who has tried to work with a large spreadsheet on a laptop computer will realize **how important it is to be able to see and access as much information as possible at one time.**

Productivity Comparison of 17-inch, 20-inch, and 30-inch Displays

Check High-Resolution Image for Sharpness
Time scale in seconds. Shorter is better.

Apply Selective Formatting in Large Spreadsheet (Excel)
Time scale in seconds. Shorter is better.

Productivity gains scale as one increases the size of the display. These charts show the results of productivity measures comparing a 17-inch, a 20-inch, and a 30-inch display. On the left are the results from a test measuring the time necessary to check a high-resolution digital image for sharpness. The task took almost four times longer on the 17-inch display than on the largest one; the 20-inch display also showed a clear productivity increase. The chart on the right presents the time required to select and format cells in a large spreadsheet. Productivity clearly increases with display size and resolution.*