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Primary Research

The Benefits of HP “Instant On” Technology

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Abstract

HP offers “Instant on” technology in most LaserJet printers. This document presents information on the benefits of this technology that is based on data from a survey of 1,305 office workers, testing conducted by QualityLogic that quantifies the benefits of “Instant on” enabled printers, and our review of the technology and its applicability. Also taken into account is testing conducted by HP regarding the power consumption of monochrome and color printers from a variety of manufacturers, as well as other relevant InfoTrends research.

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Table of Contents

Executive Summary	3
Introduction	4
Key Research Highlights	5
Methodology	5
HP Instant-on Technology Defined	6
Typical Characteristics of Print Jobs and Users’ Devices	6
The Benefits of HP Instant-on Technology (IoT)	7
Increased Speed.....	7
<i>The Value of Faster Printing</i>	8
Reduced Energy Consumption.....	10
Conclusion	11

List of Figures and Tables

Figure 1: Components of Printers That Use Instant-on Technology vs. Conventional Fuser Technology..	6
Figure 2: Average First Page Out Speed for Monochrome Printers.....	7
Figure 3: Average First Page Out Speed for Color Printers	8
Table 1: Savings Resulting from Using Printers with IoT.....	9
Figure 4: Warm-up Time and Power Consumption of Devices with Instant-on Technology vs. Devices with Conventional Fuser Technology.....	10

Executive Summary

When purchasing monochrome or color printers, most buyers base their decision on two primary factors: speed—or the number of pages per minute (PPM) a device is rated for—and price. They balance these two factors to meet a specific set of needs. Rarely do buyers consider printer productivity on a per-job basis (i.e. for an average print job, how long does it take for the first page to print, and how long does it take for the entire job to print). As this research will show, the actual printer productivity can be a more telling measure of the cost-effectiveness of a printer than its rated PPM.

When office workers print a job, they usually send it to a device that is in sleep mode. The printer has to “wake up” before printing the job. The result, in many cases, is that it takes longer to complete the print job than one would expect based on the rated speed of the device.

Tests performed by QualityLogic¹ found that Instant-on Technology (IoT) from HP provides users with a much faster print time than most competitive products. Instant-on Technology allows users to be more productive. It also effectively avoids contention issues on a given printer when multiple users send jobs to the device at roughly the same time by moving jobs out of the print queue faster.

In addition, according to research conducted in HP labs, Instant-on Technology reduces the average energy consumption of printers. This savings can be relatively minor for an office with one or two printers, but for larger organizations with thousands of printers, the energy savings generated by Instant-on Technology can add up.

“Instant-on Technology allows us to print faster and get quicker results. This increases productivity and efficiency in the workplace.”

*Research Assistant
Major Midwest University*

¹ QualityLogic Inc. is a Software Quality Test Tools and Services Company, with a focus on Digital Imaging and Telecommunications industries. QualityLogic is headquartered in Moorpark, California, northwest of Los Angeles. The Company’s U.S. test labs are located in Moorpark and Boise, Idaho. (www.qualitylogic.com)

Introduction

When purchasing monochrome or color printers, most buyers base their decision on two primary factors: speed—or the number of pages per minute (PPM) a device is rated for—and price. They balance these two factors to meet a specific set of needs. Rarely do buyers consider printer productivity on a per-job basis (i.e. for an average print job, how long does it take for the first page to print, and how long does it take for the entire job to print). One might assume that if a printer has a faster rated speed it will produce printed pages faster; however, as this research indicates, that is not always a reliable assumption.

The time it takes for the first page to exit the printer is critical to printer productivity. Many, but not all, manufacturers include first page out (FPO) time in their product specifications, but they do not specify whether measurement commences when the printer is warmed up and ready to go, or from power-save mode. Some printers enter sleep, or power-save, mode within as little as five minutes after printing a job, and printers can take significant time—and consume significant energy—waking up from power-save mode and preparing to print. For example, one printer from a well-known manufacturer rated at 22 PPM for color printing took *more than a minute* to generate the first page from sleep or power-save mode during tests by QualityLogic, a Software Quality Test Tools and Services Company with a focus on the Digital Imaging and Telecommunications industries.

InfoTrends’ research indicates that the average office worker prints ten jobs a day, with the typical job being four to five pages in length. In fact, 60% of office printing consists of documents that are less than five pages long. The typical print job is most likely being printed from the Microsoft Office suite between the hours of 8 a.m. and 6 p.m. As most workers attempt to accomplish more work in less time by leveraging technology, the time consumed while waiting for printed output can seriously impact office productivity.

To improve print productivity, HP has added an Instant-on capability to its office printers. Instant-on Technology (IoT) virtually eliminates warm-up time from power-save mode. At its core is a fast-heating fuser that enables the printer to switch into action immediately, regardless of when it was last used, and return to power-save upon completing the job. IoT charges the fuser’s heating element quickly, which allows a page to print out within seconds of being processed.

The “Instant on” feature of HP LaserJet printers enables office workers to complete their work in less time by reducing wait time for print jobs to be completed. Test results from QualityLogic found that the HP LaserJet printers are about 2.5 times faster on average than competitors’ products that do not feature this technology.

This is especially important in light of typical office worker behavior. If a job is printed to a shared workgroup printing device, a user will typically walk over to the printer at that time to pick up the output. This can result in unproductive wait time if the printer requires excessive time to deliver the first copy out and to print the entire job. When multiple users send work to a shared printer simultaneously, wait times can be longer, causing contention and more inefficiency. Even when using a personal desktop printer, workers are likely to wait for the document to print before beginning other tasks.

In addition, Instant-on Technology reduces the overall energy consumption of office printers. Competitive monochrome printers without Instant-on Technology can consume up to six times as much energy annually as an HP monochrome printer with this feature. Competitive color printers can consume up to four times as much energy annually as a color printer equipped with HP Instant-on Technology. These energy costs add up, especially for organizations with a large number of distributed printers.

Key Research Highlights

- Office workers are likely to send a job to a printer that is in sleep (or power-save) mode, resulting in longer wait times for print jobs to be produced.
- HP LaserJet printers with Instant-on Technology are 2.5 to 2.6 times faster on average than competitive products, and in many tests, a five-page job finished printing on the HP printer before the competitive device had even printed the first page.
- Instant-on functionality enables higher productivity in the office and results in energy savings.

Methodology

InfoTrends conducted sponsored research in the office market for HP that provides the basis for our use analysis. The research was conducted to generate an understanding of the printing behavior of general office workers in the U.S. and Western Europe. It was designed to determine the characteristics of the jobs that are printed in terms of frequency, number of pages, and the applications used. Data was collected via a Web-based survey conducted in September 2006. To qualify, respondents had to be users of print devices at work, and they were required to work more than 30 hours per week. The survey consisted of 730 respondents from the U.S. and 575 from Western Europe (221 in the U.K., 221 in France, and 133 in Germany). Qualified respondents that completed the survey received a small financial incentive in exchange for their participation.

Subsequently, QualityLogic, a software quality test tools and services company with a focus on the digital imaging and telecommunications industries, performed tests to compare the print throughput performance of HP LaserJet printers with a number of competitive monochrome and color devices. The devices that were chosen represented a broad range of performance and price points from various manufacturers.

During the testing, QualityLogic printed a document from its test suite that consisted of five pages. Documents were sent to the respective printers after they had been in power-save mode for at least 30 minutes. Testing was performed using the QualityLogic PageSense 4.2 automated performance test tool, which was connected to a desktop personal computer with an Intel P4 3.2GHz processor with 2GB of memory, that was running on the Microsoft Windows XP Professional Edition operating system. All printers were connected to the test computer via a USB connection.

All print drivers were installed using the default settings, and the documents were printed on letter size paper. QualityLogic selected test files that it considered to be typical of a small/medium-sized business. The test included files from Microsoft Internet Explorer 6.0, the Microsoft Office 2000 Suite, and Adobe Acrobat Reader 6.0, as the end user study determined that these were common applications. This testing was commissioned by HP.

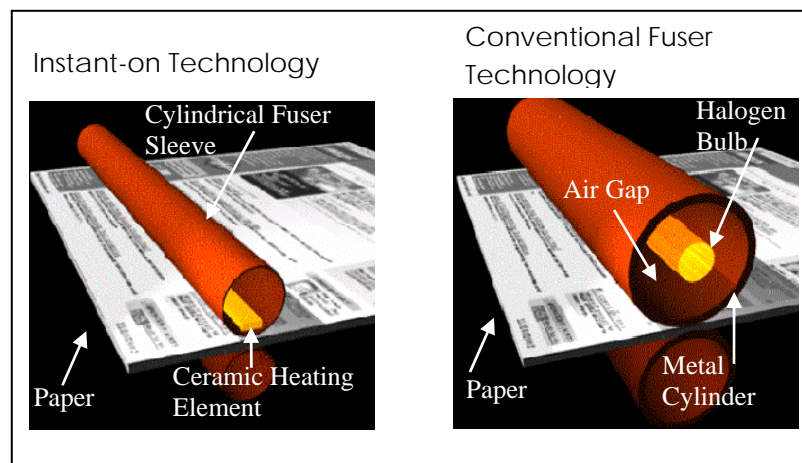
HP Instant-on Technology Defined

Found in most HP LaserJet printers today, Instant-on Technology (IoT) is a key HP product differentiator that virtually eliminates warm-up time from power-save, or sleep, mode. At its core is a fast-heating fuser that enables the printer to switch into action immediately, regardless of when it was last used, and return to power-save after completing the job. IoT charges the fuser’s heating element quickly, allowing pages to print out within seconds of being processed.

At the fusing station, the toner is fused onto the paper by heat and pressure to produce a permanent image. In printers with IoT, the paper passes between a ceramic heating element protected by a thin cylindrical fuser sleeve and a soft pressure roller (see Figure 3). Once the heater is at its fusing temperature, IoT does not require any additional energy while in power-save mode.

Conventional printers, on the other hand, use metal fusing cylinders and halogen heating lamps. They require a prolonged warm-up time of up to 60 seconds as well as frequent reheating to maintain a minimum standby temperature for 15 to 30 minutes before going into power-save mode. When a new print job is sent after the printer enters power-save mode, the full warm-up cycle must be run again, requiring additional waiting time and consuming even more energy.

Figure 1: Components of Printers That Use Instant-on Technology vs. Conventional Fuser Technology



Typical Characteristics of Print Jobs and Users’ Devices

InfoTrends’ end user research has found that most users print ten jobs per day, with each job consisting of four or five pages. Printing is generally spread out over the course of the workday. While over 60% of users print an average of 5 pages or less per document, “power users” print a much higher quantity and drive the overall average up to 11.3 pages.

As evidenced by the data regarding job length, equipment utilization, and the time of day jobs are typically sent to a printer, it is likely that the printer will be in sleep or power-save mode when a user commences printing. Printers can enter sleep mode after only five minutes of inactivity. Among those who share a print device, 23.6% reported that they believed the printer would be in sleep mode when they initiated a print job. Of course, many respondents with a shared printer own an HP device, and most of them would enjoy the benefits of Instant-on Technology. (HP had a 45.6% market share among survey respondents).

The average time reported between print jobs was 154 minutes, and the study found that on average, shared printers are used by 7.6 users each. Specific product features, such as speed, were mentioned as important purchase criteria by 60.4% of those with shared devices. The default shared printer used by 45.8% of respondents was a monochrome laser printer or laser printer-based MFP, while 17.8% of respondents cited a color laser printer or laser printer-based multifunction device. The balance reported using either an inkjet printer or copier-based device.

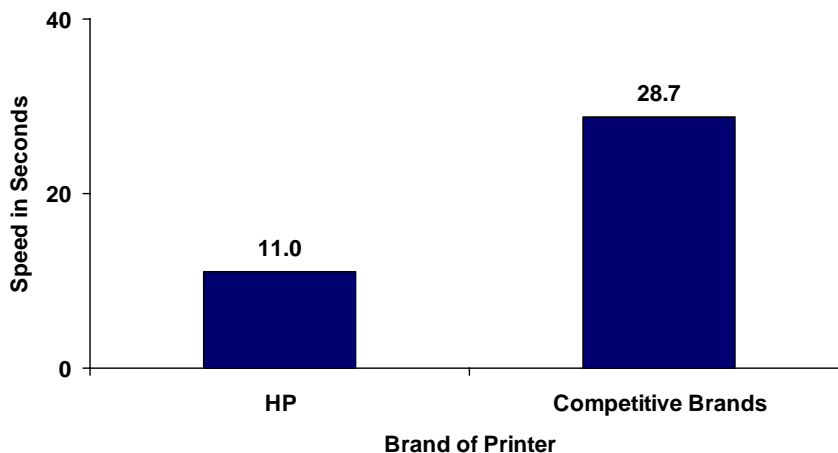
The Benefits of HP Instant-on Technology (IoT)

Increased Speed

QualityLogic tested a variety of monochrome and color laser printers consisting of seven monochrome HP printers with Instant-on Technology and 31 competitive products. The tested printers had list prices ranging from \$99 to \$1,649 and published speeds between 15 and 55 PPM. QualityLogic measured the number of seconds it took for the first page to be produced as well as the total time required to produce a five-page job. For monochrome printers, QualityLogic found that HP printers are much faster than their competitors when printing from power-save mode. Instant-on Technology allowed the HP printers to print 2.6 times faster, on average, than the competitive devices that did not have Instant-on capability. Many times, the HP printers had completed printing the entire five-page document before the competitive printer had printed its first page.

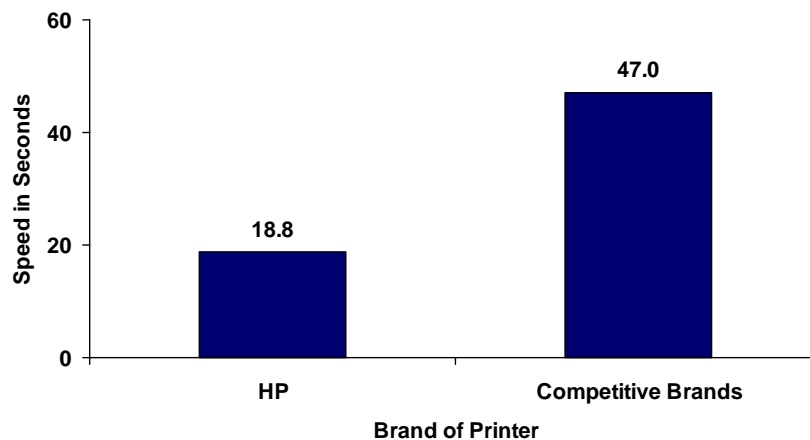
In no case was an HP printer slower to complete a print job than a competitive device with an equal or lower list price. The time it takes to print the first page is an important factor. Figure 1 illustrates the findings of the study in which the tested HP printers completed print jobs an average of 2.6 times faster than the competitive products.

Figure 2: Average First Page Out Speed for Monochrome Printers



Equivalent testing on color printers produced similar results. QualityLogic tested seven HP color laser printers with Instant-on Technology and 25 competitive models. The tested printers had list prices ranging from \$241 to \$2,625 and published color page speeds between 5 and 42 pages per minute. As it did in the monochrome testing, QualityLogic measured the number of seconds it took for the first page to be produced along with the total time required to print a five-page job. QualityLogic found that the HP color printers with Instant-on Technology printed the test job 2.5 times faster, on average, than the competitors that did not offer this feature. As was the case with the monochrome printers that were tested, the HP printers often completed printing the entire five-page document before the competitive printer had finished printing the first page.

Figure 3: Average First Page Out Speed for Color Printers



The Value of Faster Printing

Waiting a minute or so more for a print job to finish printing may seem like a minimal concern, but time spent waiting for jobs to be printed can add up. As noted previously, users are more likely to wait for a document to finish printing than not; therefore, if less time is required for a printer to warm up, employees spend less time waiting for jobs to print and their productivity increases.

“Instant-on saves a lot of waiting time if you are the first to print after a long period of time. It can mean the difference between having your report printed out ‘one time’ or being late to a meeting while you can wait for the printer to warm up.”

*Network/Systems Administrator
Women’s Liberal Arts College located in the Midwest*

Table 1 presents findings based on an average office worker that earns \$41,600 annually. With a 35% burden rate, that employee costs \$27 per hour. The Table below presents several examples from the QualityLogic research that demonstrate how time spent waiting for jobs to be printed can mount up over the course of a year. Calculations were made based on the fact that the average user produces 10 jobs per day, and a 48-week year was used to account for vacation and other time spent absent from work during the year.

As the Table indicates, QualityLogic testing revealed that using an HP printer with Instant-on Technology can result in significant soft dollar savings when comparing monochrome and color printers with equivalent rated speeds. Interestingly, even slower, less expensive HP printers with Instant-on Technology can deliver faster throughput than competitive devices with higher PPM ratings. Note, for example, the comparison between the 15 PPM HP mono printer with Instant-on Technology and the 50 PPM mono printer without the IoT feature; in this case, the 15 PPM HP printer finished printing a five-page document in slightly less time than the 50 PPM competitive device.

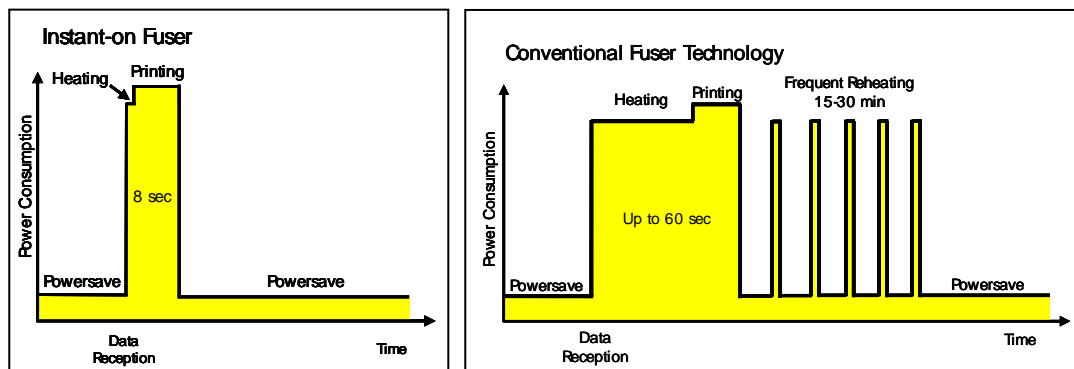
Table 1: Savings Resulting from Using Printers with IoT

Product Comparison (List Price)	Hours Saved per User per Year with IoT	Soft-Dollar Savings	Hours Saved for 20-Employee Department	Soft-Dollar Savings
8 PPM HP Color Printer (\$299) vs. Competitive 8 PPM Color Printer (\$899)	22	\$594	453.3	\$12,239
22 PPM HP Color Printer (\$799) vs. Competitive 22 PPM Color Printer (\$699)	40	\$1,080	799	\$21,573
22 PPM HP Color Printer (\$799) vs. Competitive 35 PPM Color Printer (\$999)	18.2	\$491	364	\$9,828
27 PPM HP Mono Printer (\$349) vs. Competitive 27 PPM Color Printer (\$199)	14.6	\$394	292	\$7,884
35 PPM HP Mono Printer (\$549) vs. Competitive 50 PPM Color Printer (\$899)	8.1	\$219	162.7	\$4,393
15 PPM HP Mono Printer (\$179) vs. Competitive 50 PPM Color Printer (\$899)	.8	\$22	16	\$432

Reduced Energy Consumption

In separate testing, HP labs measured the energy consumption of a range of HP and competitive devices. Because printers equipped with Instant-on Technology do not require frequent reheating to maintain a minimum standby temperature during the period of time between when a job is completed and when the printer enters power-save mode, they use less energy. Figure 4 compares the typical cycles of printers with Instant-on Technology with those of devices that use conventional fuser technology.

Figure 4: Warm-up Time and Power Consumption of Devices with Instant-on Technology vs. Devices with Conventional Fuser Technology



In one test, HP compared three HP color printers with Instant-on Technology to nine similar competitive printers without IoT. The costs of energy consumption of the HP printers ranged from \$17.67² to \$22.88 per year, while the competitive printers averaged \$31.22 in average annual energy costs, with one printer nearing \$70 in annual energy costs.

Similar results were found when testing was conducted on monochrome printers. In one test, two HP monochrome printers were compared with seven similar competitive models. HP's average annual energy cost was \$21.93, compared with an average of \$30.34 for the competitive printers. In another test, three less expensive HP monochrome printers were compared with equivalent printers from competitive manufacturers. In that test, HP averaged \$3.47 in annual energy costs, while the competitors averaged \$13.36. As these smaller printers are likely to be installed in large numbers as personal desktop printers in many large organizations, these energy savings can be a significant factor in the cost justification of printer purchases.

Much higher energy savings can be achieved by replacing several desktop printers with an HP workgroup printer with Instant-on Technology. InfoTrends' research indicates that shared printers are used by an average of 7.6 users. By replacing eight low-end competitive personal desktop monochrome printers with one HP workgroup monochrome printer, for example, energy costs can be reduced from an average of \$107 annually to just over \$20 annually. Add to that the overall reduction in list price investment for purchasing printers—nearly \$1,600 for eight personal desktop printers compared to less than \$1,000 for a single workgroup printer—and the savings are even more significant.

² Energy costs calculated at \$0.10 per kilowatt hour.

Conclusion

In today’s fast-paced business world, faster is better and cost savings are the name of the game at most companies. This research has shown that for the average user and the “power user,” HP Instant-on Technology provides significant productivity benefits. The first page out speed of Instant-on HP printers is about 2.5 times faster than competitive devices that lack this feature. Time spent waiting for print jobs results in a reduction in the productivity of employees, as demonstrated by the soft-dollar savings analysis. In addition, energy costs for printers without Instant-on Technology are significantly higher.

Based on end user data and product testing, the bottom line benefit of HP Instant-on Technology is a decrease in the time spent waiting for print jobs to finish and a resulting increase in the time employees have to devote to other business functions, along with a reduction of an organization’s carbon footprint obtained through reduced energy consumption.

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