

Summary Report

Comparative Study: Canon N1000 Office Color Printer

vs. Hewlett-Packard hp color inkjet printer cp1160

The *SpencerLab* Digital Color Laboratory, a division of Spencer & Associates Publishing, Ltd, has conducted independent comparative testing and evaluation of the Canon N1000 Office Color inkjet printer. The comparison evaluated *Throughput Speed Performance* and *Print Quality* of the Canon N1000 Office Color and the Hewlett-Packard hp color inkjet printer cp1160, utilizing representative real-world documents from the *SpencerLab* Printer Test Suite¹, including professional office and photographic applications.

Summarizing these test results, *the Canon N1000 Office Color Printer provides a significant throughput speed benefit over the hp cp1160, providing faster speed in all tests – some three times faster in graphic-intensive documents.* Print Quality of the Canon N1000 exceeds that of the hp cp1160 in tints and blends, and offers excellent text in the small point sizes.

With impressive speed combined with competitive print quality, the Canon N1000 Office Color Printer *provides business inkjet users with an excellent combination of quick turn-around and output.*

The *SpencerLab* Digital Color Laboratory is an independent test laboratory with a broad base of industry clients. Although conducted under Canon sponsorship, *SpencerLab* believes these test results maintain its reputation for the integrity of its procedures and analyses. Results stated herein are based upon testing of actual products believed to be representative.

Throughput Speed

Methodology

Six test document files were selected from the *SpencerLab* Printer Test Suite to represent an appropriate range of user applications for this class of business inkjet printers:

- *Letter with Chart* (Microsoft Word 2000) – black text with color logo and graph
- *Ten-Page Report* (Microsoft Word 2000) – black text with color logo and headings, and a table with gridlines
- *Table & Charts* (Microsoft Excel 2000, two pages) – text on color with business charts; spreadsheet
- *Presentation* (Microsoft PowerPoint 2000, eight pages) – blends, text and graphics on various backgrounds
- *Newsletter* (QuarkXPress 4.1) – mixed text, color graphics and photograph
- *Castle* (Adobe Photoshop 6.0) – sRGB photograph

Since the print modes available on each printer are different, a focused print quality analysis determined comparable output quality levels for each file. Mode selection was based on their applicability to similar user scenarios and the content of each document. Accordingly, test documents with more critical graphics were tested at higher quality levels than those with more general graphics. Based on the results of this comparison, throughput tests were then performed in the following modes:

THROUGHPUT MODES	Canon N1000 Office Color	hp color inkjet cp1160
<i>Letter with Chart</i>	PRINT QUALITY: HIGH	PRINT QUALITY: BEST
<i>Ten-Page Report</i>	PRINT QUALITY: STANDARD	PRINT QUALITY: NORMAL
<i>Table & Charts</i>	PRINT QUALITY: STANDARD	PRINT QUALITY: NORMAL
<i>Presentation</i>	PRINT QUALITY: HIGH	PRINT QUALITY: BEST
<i>Newsletter</i>	PRINT QUALITY: HIGH	PRINT QUALITY: BEST
<i>Castle</i>	PRINT QUALITY: HIGH	PRINT QUALITY: BEST

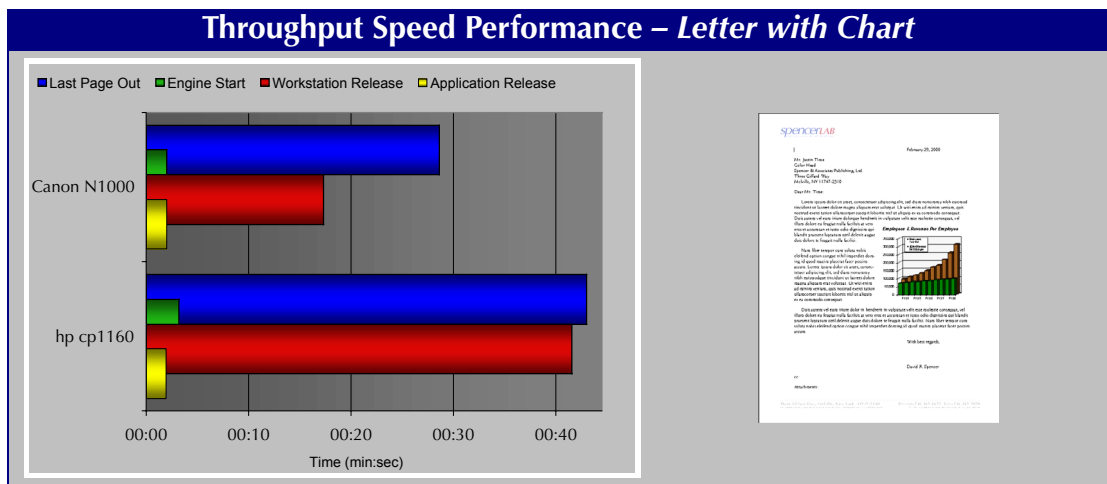
All times are measured from the request-to-print. The TOTAL PRINT TIME measurement, also referred to as “CLICK-TO-CLUNK” or LAST PAGE OUT TIME (LPOT, when the last page drops into the output tray), was augmented by measurements of APPLICATION RELEASE and WORKSTATION RELEASE, ENGINE START (a perceptible sound or mechanical action), and FIRST PAGE OUT TIME (FPOT).

Directly impacting user workflow, APPLICATION and WORKSTATION RELEASE times allow the user to resume working, and the workstation to return to full processing power, respectively. ENGINE START time provides important user feedback – that the print request has progressed to physical printing. All timings are recorded for each test document over several iterations to assure accurate results².

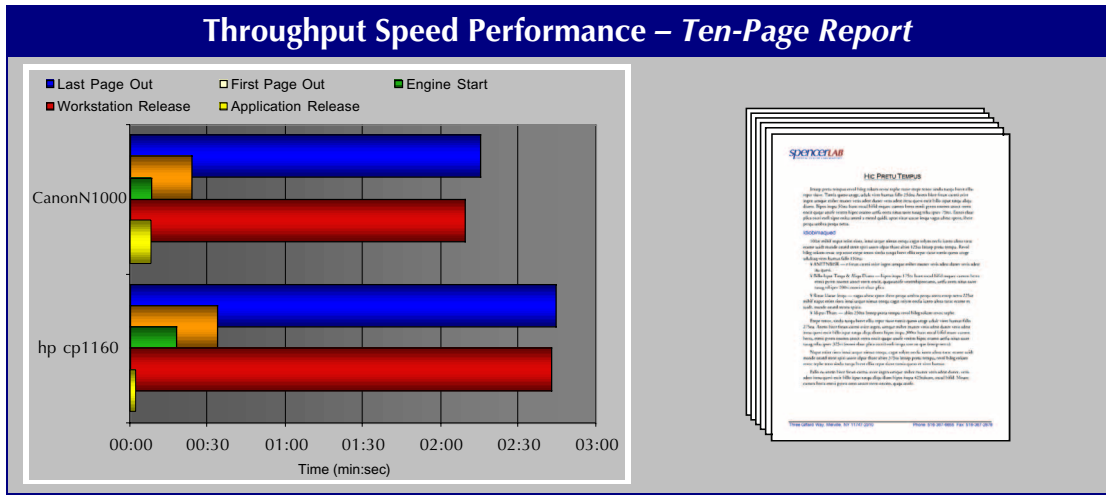
Testing was performed on a 1.6 GHz Dell Dimension DIM-4300 Pentium 4 workstation with 128 MB RAM and a 4 GB hard drive running Windows 2000 and USB communication with each printer, one-at-a-time to the Canon N1000 and the hp cp1160. Clean system software was reinstalled before testing each printer, including only that printer’s current driver.

Test Results

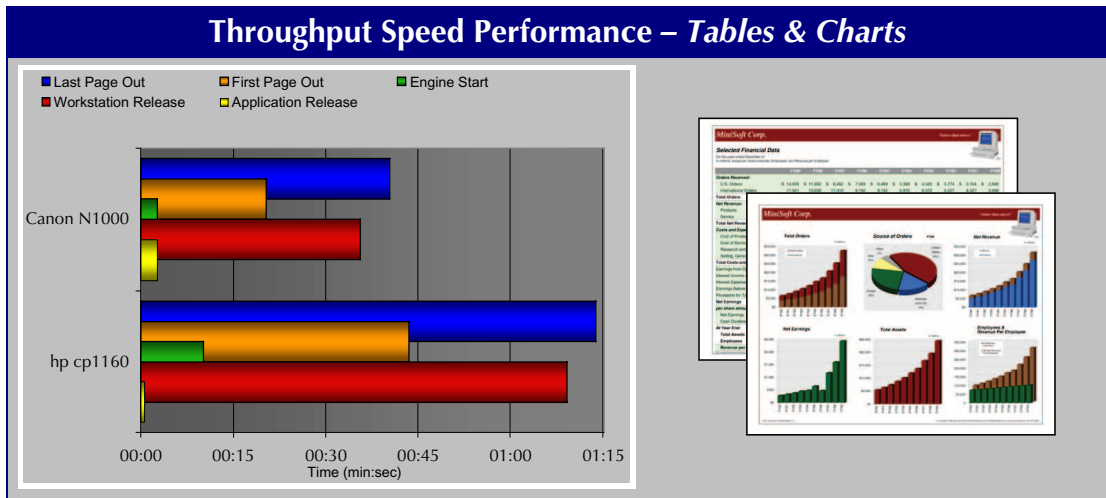
Throughput Speed Performance tests demonstrated a Canon N1000 print speed advantage over the competition. The Canon N1000 was faster than the hp1160, on all documents tested – some over three times faster.



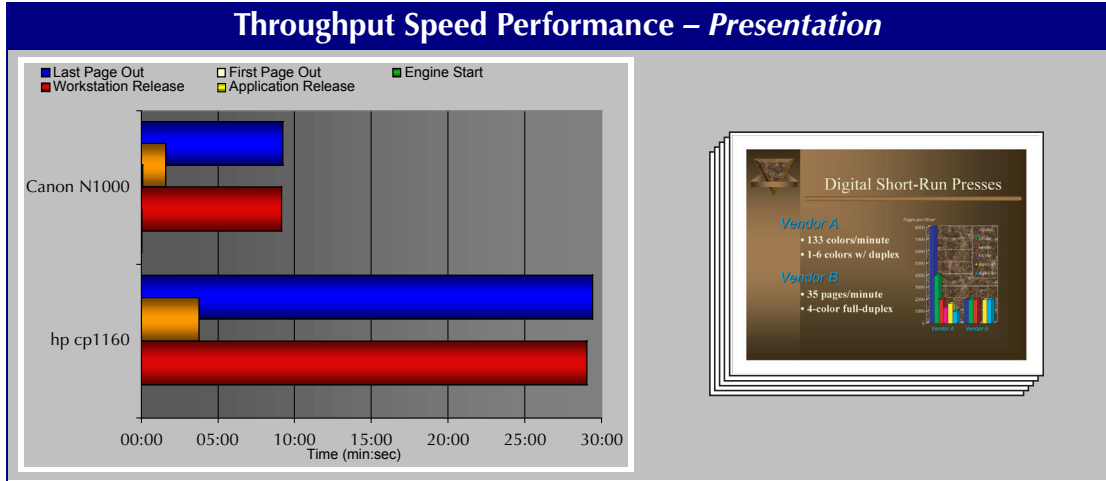
The TOTAL PRINT TIME (LAST PAGE OUT TIME) of the N1000 for the *Letter with Chart* test document was 28.9 seconds,³ with the cp1160 at 43.5 seconds, taking 51% longer or 14.6 seconds. APPLICATION RELEASE and ENGINE START occurred simultaneously on the N1000 at only 2.0 seconds; the cp1160 also released quickly at 1.9 and 3.2 seconds. WORKSTATION RELEASE was 24.5 seconds faster on the N1000 (17.5 seconds) than on the cp1160 (42.0 seconds). WORKSTATION RELEASE on the cp 1160 was not until 1.5 seconds prior to TOTAL PRINT TIME.



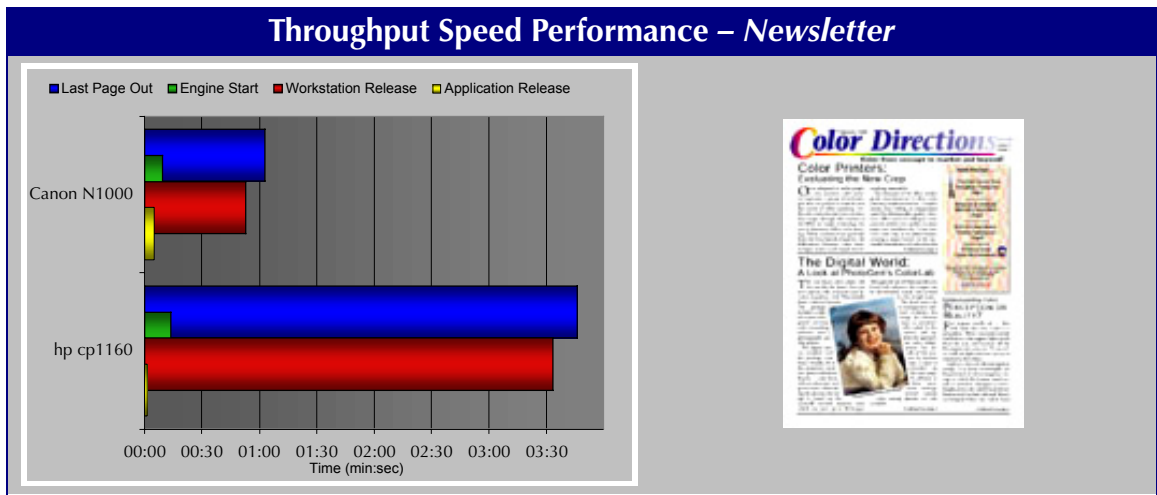
The N1000 completed printing of the *Ten-Page Report* test document with a TOTAL PRINT TIME of 2:15. The cp1160's TOTAL PRINT TIME of 2:45 was thirty seconds longer. FIRST PAGE OUT TIME on the N1000 was 23.8 seconds, almost 10 seconds faster than the 33.5 seconds taken by the cp1160. APPLICATION and ENGINE START times on the N1000 were equal (8.3 seconds), whereas APPLICATION RELEASE was 2.2 seconds and ENGINE START was 15.4 seconds later (17.6 seconds) on the cp1160. WORKSTATION RELEASE was 2:09 on the N1000 and 2:43 on the cp1160, 34 seconds slower.



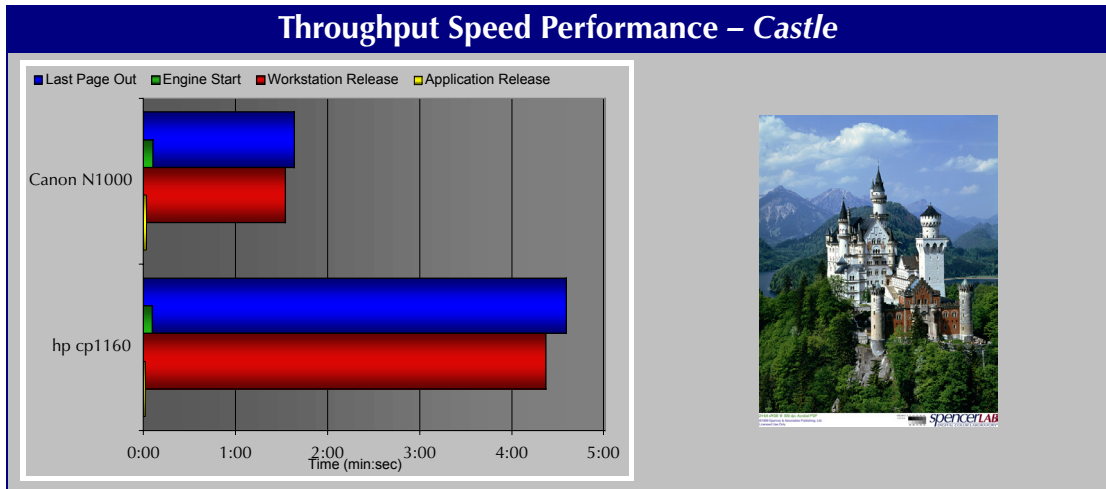
On the *Tables & Charts* test document, the N1000 completed printing of the two pages in a TOTAL PRINT TIME of 40.2 seconds, while the cp1160 took 1:13, almost twice as long. While APPLICATION RELEASE on the cp1160 was quicker at 0.6 seconds than the N1000 (2.7 seconds), the ENGINE START on the N1000 (also 2.7 seconds, same as APPLICATION RELEASE) was faster than on the cp1160 (10.1 seconds). WORKSTATION RELEASE on the N1000 (35.4 seconds) was twice as fast as on the cp1160 (1:09). The N1000 offers an overall speed advantage over the cp1160 starting with first page availability (FIRST PAGE OUT TIME) of 20.2 seconds, compared with 43.3 seconds on the cp1160.



The most remarkable difference in speed between the two printers was evident on the *Presentation* test document; the TOTAL PRINT TIME of the N1000 at 9:15 was significantly faster than the cp1160 at 29:26, which took more than twenty minutes longer to print. This performance on a graphic-intensive, 8-page document demonstrated that the N1000 controller's processing ability is significantly more powerful. Although APPLICATION RELEASE of the N1000 was 5.3 seconds slower than the cp1160 (1.7 seconds), ENGINE START of the N1000 (3.7 seconds) was faster than the cp1160 (5.6 seconds). With a WORKSTATION RELEASE speed of 9:10 on the N1000 versus 29:03 on the cp1160, the N1000 was over three times faster.



On the *Newsletter* test document, the N1000's TOTAL PRINT TIME of 1:03 was faster than the cp1160 at 3:46, which took over three times longer to print. Again, although APPLICATION RELEASE of the N1000 (4.9 seconds) was slower than the cp1160 (1.5 seconds), ENGINE START of the N1000 occurred at 9.4 seconds, whereas the cp1160 did not achieve ENGINE START until 13.0 seconds. With a WORKSTATION RELEASE speed of 53 seconds, the N1000 was over four times faster than the cp1160 at 3:34.



The N1000 completed printing of the *Castle* image test document with a TOTAL PRINT TIME of 1:38. The cp1160's TOTAL PRINT TIME of 4:35 was once more almost three times slower than the N1000. APPLICATION RELEASE and ENGINE START of the N1000 at 2.2 and 6.2 seconds, was slower than the cp1160 at 1.2 and 5.7 seconds. WORKSTATION RELEASE of the N1000 (1:32) was correspondingly faster than the cp1160 (4:22), by almost three times.

It should be noted that on all test documents the WORKSTATION RELEASE on the cp1160 occurred just seconds before TOTAL PRINT TIME.

Print Quality Analysis

Methodology

A range of test documents from the *SpencerLab* Printer Test Suite was printed on each of the printers in a range of print modes, after printer setup and alignment. These test documents included current versions of the *Color Spectrum*, *Graphic*, and *Graphic RGB* PostScript programs (originally developed as part of the *Color Hardcopy Quality Factors* study series). Also included were the *Enhanced Graphic* PostScript program (originally developed as part of the *Hardcopy Quality Enhancement* study) and a range of images and application test documents from the suite, covering a variety of printing requirements. Print Quality was analyzed by element type (e.g., black and color text, graphics, tints, blends, and images) across these test documents. The Canon N1000 was acquired from Canon USA prior to commercial release; a single printer of each manufacturer model was used in analysis and the printers are assumed to be representative of production units.

Analysis Results

For the typical office user, the Canon N1000 Office Color offers acceptable print quality, with Text rendered exceptionally at the lower point sizes, and Tints and Blends that are of excellent quality. Of less importance to office users, photographic image quality on the cp1160 was superior.

Black Text on the N1000 is generally rendered thicker than the text characters of the cp1160 and HIGH mode produces Black Text well at 6-point and above, with only minor defects, with text legible down to 2-point. HIGH mode produces slightly higher quality text than STANDARD mode, displaying finer, better-rendered characters. On the cp1160, Black Text in BEST mode is

very similar to that produced in NORMAL mode; however, whereas NORMAL mode produces text that is legible down to 4-point, BEST mode text is legible down to 2-point. On Black Lines the N1000 and the cp1160 are comparable.

On Color Text, the N1000 produces better text quality than the cp1160 at 6-point and below, and comparable at 8-point and above. On Screened Text, the N1000 produces good quality at the lower point sizes. At 4-point and below the N1000 renders better Screened Text than the cp1160, but at 6-point the cp1160 Screened Text is smoother and serifs are rendered better. At 8-point and above the N1000 and the cp1160 are again comparable. The N1000 also provides good quality Reverse Text, especially at the lower point sizes. While contrast on the cp1160 is better than on the N1000, at 4-point and below, in Best mode, the N1000 text itself is rendered better than that of the cp1160.

The N1000 produces excellent Tints that are smooth and well-saturated, with no significant patterning, whereas the cp1160 produces Tints with minor graininess, especially in pastels. Color within the individual N1000 tints is uniform, with RGB tints having better saturation than CMY tints. The N1000 renders excellent Blends that are smooth and well-saturated, superior to those of the cp1160, in RGB and especially in CMYK.

Both the N1000 and the cp1160 render Images that are sharp and offer good coloration. The N1000's sky color has a slight cyan cast, but is more realistic than the cp1160's magenta cast. The N1000 can produce higher saturation, but greens and reds have a yellow cast and shadows have a green cast. Skin tones produced have a yellow cast, while the 1160's lack some realism with a magenta cast.

About *spencerLAB*

The *SpencerLab* Digital Color Laboratory is an independent printer evaluation laboratory that provides services to vendors and corporations for whom color printing is mission-critical. The Laboratory follows strict guidelines in the integrity of both methodology and reporting; vendor-sponsored studies do not guarantee favorable results. *SpencerLab* has developed industry-standard test software, and performs print quality, throughput speed, cost-per-page and ink and toner cartridge yield, and ease-of-use analyses for color and monochrome printers in all technology classes, from inkjet and laser printers to digital color presses.

SpencerLab is operated by Spencer & Associates Publishing, Ltd., a premier information technology consulting boutique specializing in the application of Digital Color Technology to all aspects of color imaging. For over a dozen years Spencer & Associates has been providing strategic support to manufacturers in product planning, development, and launch. Color printing workflow analysis, print system selection, and usage optimization services are provided to corporate users.

For more information, please contact *SpencerLab* by email at info@SpencerLab.com, by telephone at 631-367-6655, by fax at 631-367-2878, or on the web at www.spencer.com and www.spencerlab.com.

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¹ The *SpencerLab* Printer Test Suite, now in beta, is an extension of Spencer & Associates' *Color Hardcopy Quality Factors* test suite, a de facto industry standard since 1990.

² Repeatability is within one percent or one second.

³ Times are denoted as min:sec.tenths, min:sec, or sec.tenths