

Throughput Speed, Print Quality Analysis, Toner/Drum Yield & Cost-per-Print, Ease-of-Use/Functionality

HP LaserJet 1320 and Dell 1700 Laser Printers Comparative Study

Final Report Presentation
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Agenda

- **Executive Summary**
 - Project Objectives
 - Overall Results
- **Throughput Speed Performance**
- **Print Quality Analysis**
- **Toner/Drum Yield and Cost-per-Print**
- **Ease-of-Use/Functionality**



Executive Summary - Project Objectives

HP LaserJet 1320 and Dell 1700 monolaser printers

Incorporate sound, unbiased testing methodologies

◦ *Independent comparative test, sponsored by Hewlett-Packard*

- *SpencerLab* attests that its methodology and procedures maintain its reputation for unbiased integrity

Comparative Study

◦ *Throughput Speed Performance*

- Including... First Page Out, Total Print Time, Manufacturer Rated Speed

◦ *Print Quality Analysis*

- Text, Lines, Tints, Blends, and Images

◦ *Cost-per-Print and Toner/Drum Yield*

- Test standard and high-capacity OEM toner cartridges compliant with ISO/IEC 19752:2004 testing standard
- Test drum yield in ISO/IEC 19752 environment
- Combine test results with manufacturer's published cartridge prices to calculate Cost-per-Print

◦ *Ease-of-Use and Functionality*

- Compare typical user experience based upon installation, control panel, printer driver/software, functionality, technical support, reliability, general observations



Executive Summary

HP LaserJet 1320 and Dell 1700 monolaser printers

Comparative Testing and Analysis

° *Throughput Speed Performance*

- On tested documents, HP LJ 1320 had faster TOTAL PRINT TIME speeds - even though Dell 1700 has a higher rated speed of 25 pages-per-minute (ppm) vs. 22 ppm for the LJ 1320.
- Faster FIRST PAGE OUT (FPO) of HP LJ 1320 resulted in overall quicker TOTAL PRINT TIMES
- In four of five tested documents, the HP LJ 1320 had a quicker APPLICATION RELEASE than the Dell 1700
- When shifting from default mode to a higher print quality setting:
 - HP LJ 1320 maintained its 22 ppm rated speed
 - Dell 1700 fell to 13 ppm – almost half its rated speed

° *Print Quality Analysis*

- HP LJ 1320 produces higher quality Reverse Text, Lines, Tints and Blends and Images
- HP LJ 1320 and Dell 1700 render comparable Text quality

° *Toner/Drum Yield and Cost-per-Print*

- HP exceeds rated cartridge yield by 10%, on both Standard and High-Capacity cartridges
- Dell falls below rated cartridge yield: by -6% on Standard and -17% on High-Capacity cartridges
- Dell drum End-of Life falls -11% short of rating
- HP has lower Toner/Drum Cost-per-Print on both Standard and High-Capacity cartridges

° *Ease-of-Use and Functionality*

- HP LJ 1320 offers user-friendly features
- HP LJ 1320 provides reliability
- HP LJ added features, including automatic duplexing
- Dell Technical Support issues



Throughput Speed Performance: Methodology

Test Documents

- *Documents selected from the SpencerLab Printer Test Suite, to reflect representative office use*
 - Letter with Chart (MS Word) – text with logo and graph, 1-page, 75 copies
 - Tables & Charts (MS Excel) - spreadsheet text with business charts; 1-page, 1 copy
 - Ten-Page Report (Adobe PDF) - text with grayscale logo and headings, and a table with gridlines; 10-pages, 1 copy
 - Color & Print Quality Report (Adobe PDF)– compound text, graphics and images in report format; 22-pages, 1 copy
 - Newsletter (Adobe PDF) – mixed text, graphics and photograph; 1-page, 10 copies

Test Environment

- *PC configuration*
 - Dell OptiPlex GX270 (Intel P4, 3.0 GHz, 40 GB HDD, 512 MB, 133 MHz DDR RAM) running Windows XP
 - Direct USB communication with each printer, one-at-a-time
- *Printer Drivers from manufacturer provided CD-ROM*
 - HP PCL 6 version: 60.41.41.0
 - Dell driver, version 20.00
- *Print Modes*
 - Default print modes used, except where noted
 - *HP LaserJet 1320 default: Plain Paper, 600 dpi*
 - *Dell 1700 default: Plain Paper, NORMAL - 1200 IQ*
 - *Newsletter test document additionally tested at higher comparable PQ driver settings*
 - Stand-by (Power-Save) Mode
 - *Stand-by mode typical of office workflow*
 - *Test documents printed at intervals of at least thirty minutes*
 - *Dell 1700 set to enter power-save mode at five minutes*
 - *HP LaserJet 1320 utilizes “Instant-on Technology”, immediately entering power-save after completion of print job*
 - Ready Mode
 - *Printers forced to Ready Mode by sending a printer test file immediately prior to printing of test document*

Test Timings

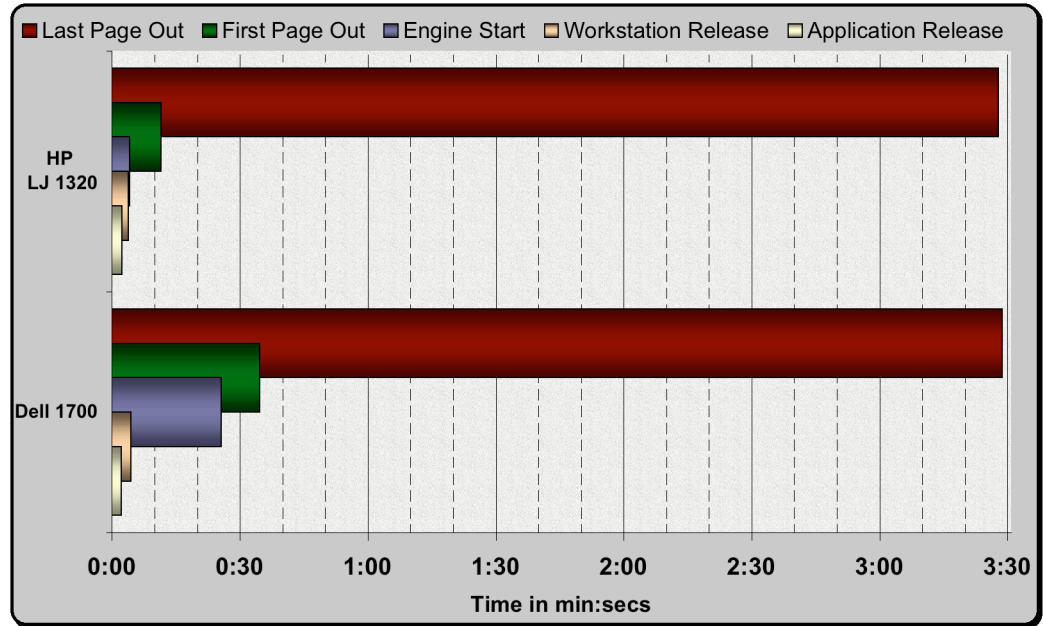
- *Testing performed using the SpencerLab PageWATCH automated digital stopwatch test tool*
- *All measurement intervals begin with request-to-print (clicking PRINT in the application’s print dialog box) including*
 - Application Release, Workstation Release, Engine Start, First Page Out (FPO), Last Page Out (LPO) or Total Print Time
- *Timings over several iterations to assure accurate results within one percent +/- one second*



Throughput Speed Performance Results



MS Word, Letter with Chart
1-page, 75 copies



- ° HP LJ 1320 delivered Comparable TOTAL PRINT TIME on this print job, even with Dell 1700 rated speeds of 25 ppm vs 22 ppm rating for the HP LJ 1320
- ° HP LJ 1320 delivered a 67% faster FIRST PAGE OUT time than the Dell 1700
- ° HP LJ 1320 delivered its FIRST PAGE OUT time before the ENGINE START of the Dell 1700

Testing performed using default driver settings from stand-by mode

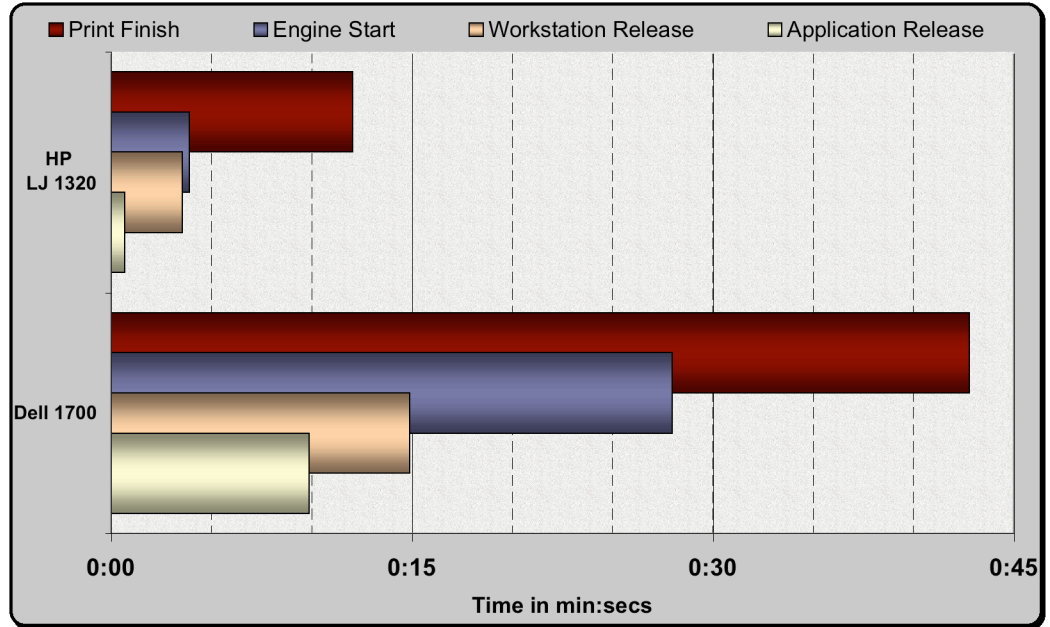


Throughput Speed Performance Results (cont'd)



Microsoft Corp.	Q1 2007	Q2 2007	Q3 2007	Q4 2007	Q1 2008
Revenue	\$ 14,820	\$ 15,024	\$ 14,925	\$ 15,228	\$ 15,400
Operating Costs	(7,240)	(7,248)	(7,248)	(7,248)	(7,248)
Operating Profit	\$ 7,580	\$ 7,776	\$ 7,677	\$ 7,980	\$ 8,152
Net Income	\$ 5,685	\$ 5,832	\$ 5,758	\$ 6,036	\$ 6,114
EPS	\$ 0.45	\$ 0.46	\$ 0.46	\$ 0.48	\$ 0.49
Operating Profit Margin	51.2%	51.8%	51.4%	52.5%	52.6%
Net Income Margin	38.4%	38.8%	38.5%	40.0%	39.7%
Operating Profit per Share	\$ 0.37	\$ 0.38	\$ 0.37	\$ 0.39	\$ 0.40
Net Income per Share	\$ 0.28	\$ 0.29	\$ 0.28	\$ 0.29	\$ 0.29
Operating Profit Growth	10.2%	10.5%	10.3%	10.8%	11.0%
Net Income Growth	10.2%	10.5%	10.3%	10.8%	11.0%
Operating Profit to Book Value	1.25x	1.25x	1.25x	1.25x	1.25x
Net Income to Book Value	0.94x	0.94x	0.94x	0.94x	0.94x
Operating Profit to Total Assets	1.25x	1.25x	1.25x	1.25x	1.25x
Net Income to Total Assets	0.94x	0.94x	0.94x	0.94x	0.94x
Operating Profit to Total Debt	1.25x	1.25x	1.25x	1.25x	1.25x
Net Income to Total Debt	0.94x	0.94x	0.94x	0.94x	0.94x
Operating Profit to Total Equity	1.25x	1.25x	1.25x	1.25x	1.25x
Net Income to Total Equity	0.94x	0.94x	0.94x	0.94x	0.94x
Operating Profit to Total Capital	1.25x	1.25x	1.25x	1.25x	1.25x
Net Income to Total Capital	0.94x	0.94x	0.94x	0.94x	0.94x
Operating Profit to Total Assets and Liabilities	1.25x	1.25x	1.25x	1.25x	1.25x
Net Income to Total Assets and Liabilities	0.94x	0.94x	0.94x	0.94x	0.94x

MS Excel, Tables & Charts
1-page, 1 copy

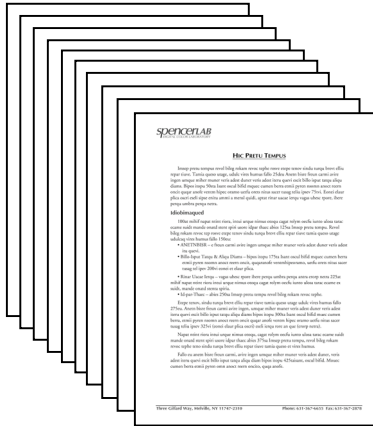


- ° HP LJ 1320 delivered a 72% faster TOTAL PRINT TIME than the Dell 1700
- ° HP LJ 1320 APPLICATION RELEASE 9.2 seconds faster than the Dell 1700
- ° HP LJ 1320 print job finished before ENGINE START on Dell 1700

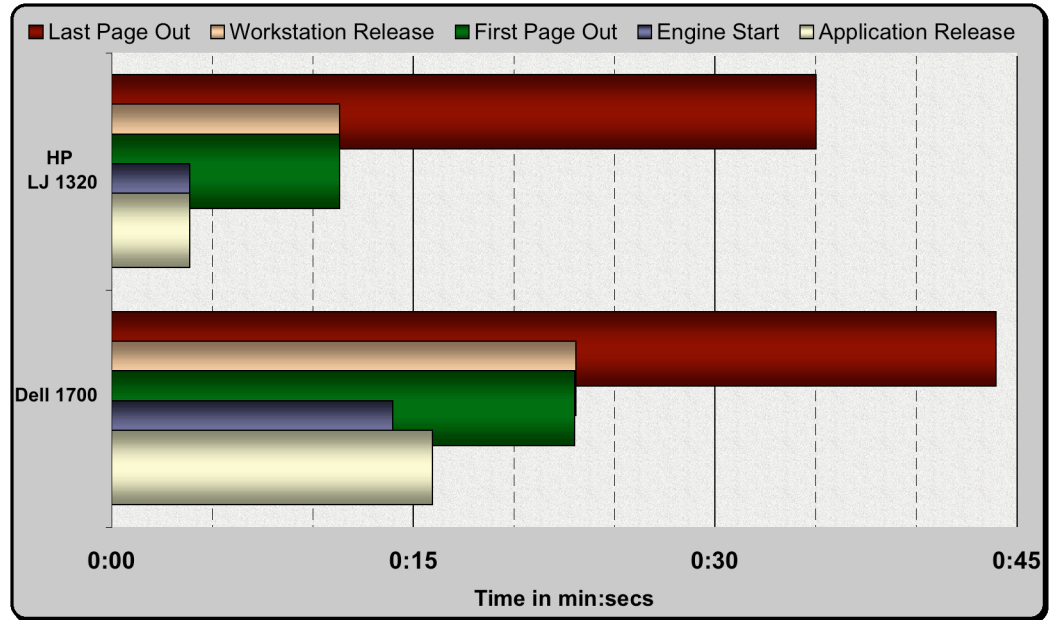
Testing performed using default driver settings from stand-by mode



Throughput Speed Performance Results (cont'd)



Adobe PDF, Ten-Page Report
10-pages, 1 copy



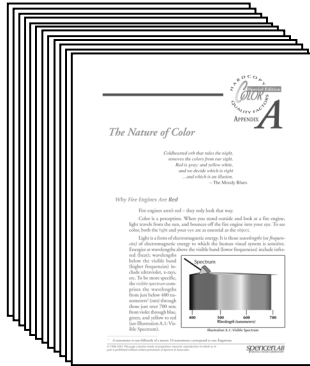
Even from a Ready State:

- ° TOTAL PRINT TIME of the HP LJ 1320 was 20% faster than the Dell 1700
- ° HP LJ 1320 delivered a 12 second faster APPLICATION RELEASE than the Dell 1700
- ° HP LJ 1320 delivered its FIRST PAGE OUT before the ENGINE START of Dell 1700

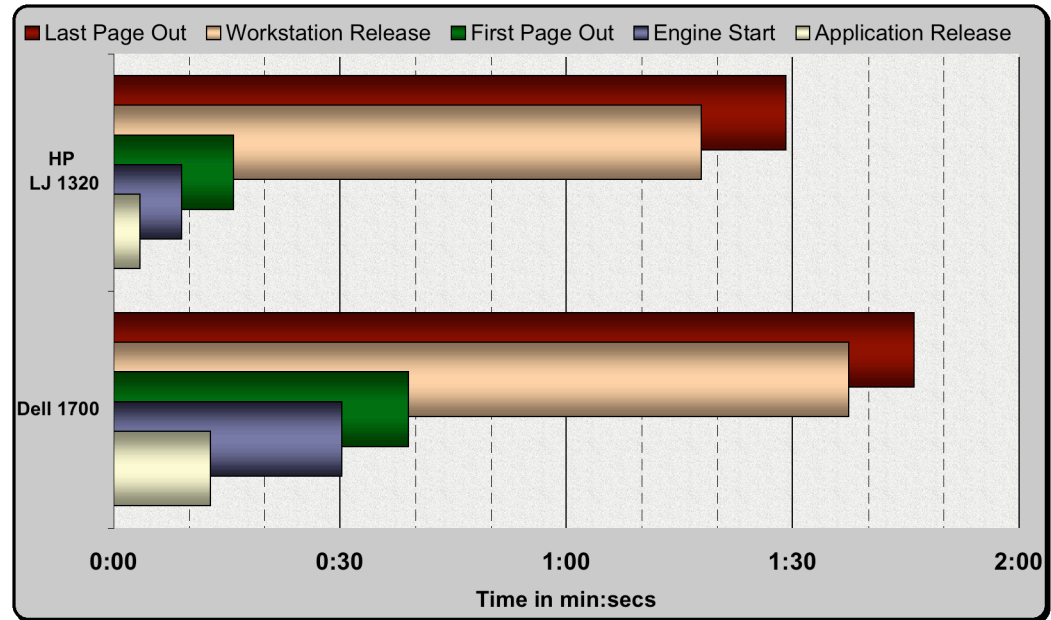
Testing performed using default driver settings from ready mode



Throughput Speed Performance Results (cont'd)



Adobe PDF, Color & Print Quality Report
22-pages, 1 copy



- ° HP LJ 1320 delivered a 16% faster TOTAL PRINT TIME than the Dell 1700
- ° HP LJ 1320 delivered a 59% faster FIRST PAGE OUT time than the Dell 1700
- ° HP LJ 1320 FIRST PAGE OUT before ENGINE START of Dell 1700

Testing performed using default driver settings from stand-by mode



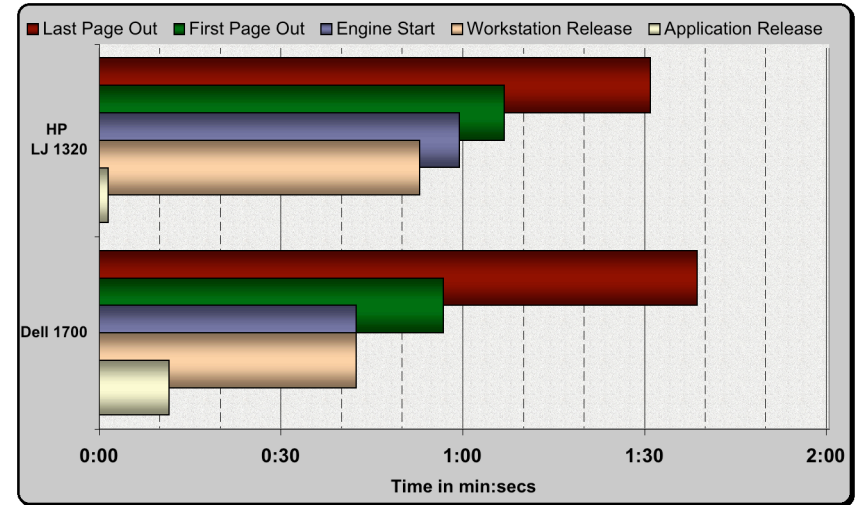
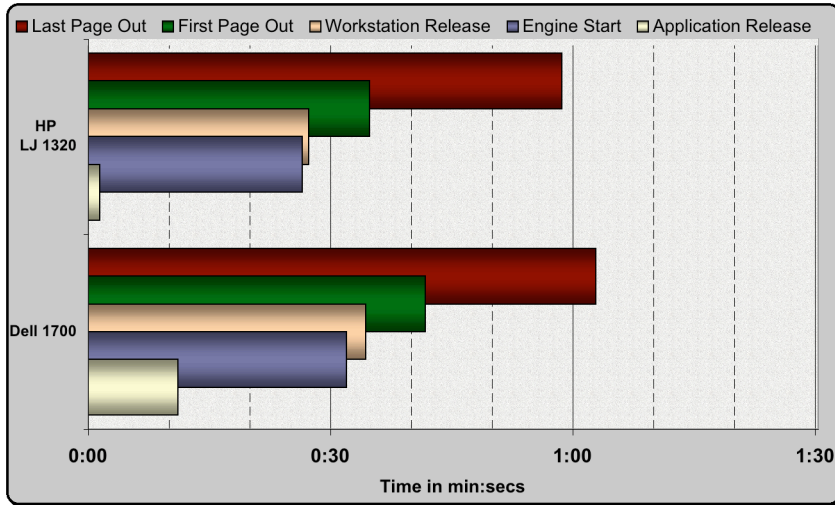
Throughput Speed Performance Results (cont'd)



Adobe PDF, Newsletter
1-page, 10 copies

Default mode

BEST mode



HP LaserJet 1320 delivered Faster Total Print Times than Dell 1700

- ° HP 7% faster Total Print Time than Dell in Default Print Quality Mode
- ° HP 8% faster Total Print Time than Dell in BEST Print Quality Mode

Default Mode - HP 1320: 600 dpi, Dell 1700: Normal-1200IQ
Best Mode - HP 1320: ProRes 1200-156 lpi, Dell 1700: 1200 dpi

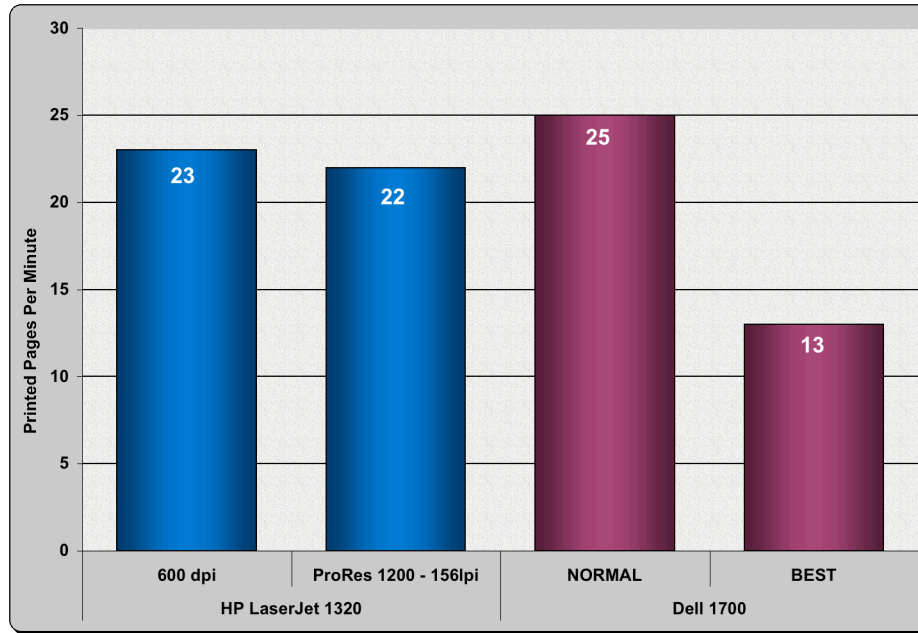
Testing performed from stand-by mode



Throughput Speed Performance Results (cont'd)



Adobe PDF, Newsletter
1-page, 10 copies



When shifting from default mode to a higher print quality mode setting:

° Dell 1700 **decreases** print speed to almost half of its Rated Speed*

° HP LJ 1320 **maintains** Rated Speed

*Manufacturer Rated Print Speeds: HP 1320 up to 22 ppm; Dell 1700 up to 25 ppm. Testing performed from stand-by mode; mechanical print speeds calculated by printing a multi-page print job and calculating Total Print Time less First Page Out time divided by the number of pages minus 1 (FPO time includes computer processing).



Print Quality Analysis Methodology

Analysis Procedure

° Results based on element types, including:

- Text
- Lines
- Tints
- Blends
- Images

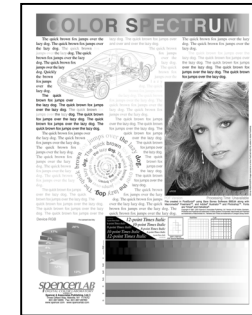
° *SpencerLab Test Suite test documents utilized*

- Range of test documents, covering a variety of printing requirements including typical office documents
- Printed on each of the printers in a range of print modes - from default to highest
- A single printer of each manufacturer was used in analysis and assumed to be representative
- Test Images printed using Adobe Acrobat Reader 6.0.2

Enhanced Black



Color Spectrum



Newsletter



Presentation



Castle



Babies



La Boca



Print Quality Analysis Results

Overall, HP LJ 1320 Print Quality superior to Dell 1700

◦ *Reverse Text*

- HP Reverse Text exhibits excellent sharpness and clarity

◦ *Lines*

- HP Lines are uniform and consistent

◦ *Tints & Blends*

- HP Tints and Blends have exceptional smoothness with even transitions

◦ *Images*

- HP Images have very good highlight and shadow details
- High saturation areas lack richness and contrast on HP output, appearing light and washed out

HP LJ 1320 and Dell 1700 have comparable Text quality

- Sharp, clear, and crisp
- Minor toner splatter visible under magnification

HP LJ 1320 produced higher quality grayscale differentiation than the Dell 1700 when printing typical office-use color documents

Print quality generalizations apply to default modes, unless otherwise stated.



Print Quality Analysis Results (cont'd)

Text

HP LJ 1320

- Comparable to Dell 1700 in sharpness and clarity
- Text legible to 2-point size and dropout free to 10-point size
- Text is well defined and fairly smooth
 - Minor toner splatter visible under magnification

Dell 1700

- Legible to 2-point size and dropout free to 8-point size
- Has well formed characters with very smooth edges
 - No visible toner splatter

Reverse Text

HP LJ 1320

- Reverse Text is smoother and sharper than output from Dell 1700
- Legible to 2-point size; fill-ins appear at 8-point size

Dell 1700

- Legible down to 4-point size
- 2-point Reverse Text completely filled in
- Fill-ins noticed as early as 14-point size

Reverse Text



Print Quality Analysis Results (cont'd)

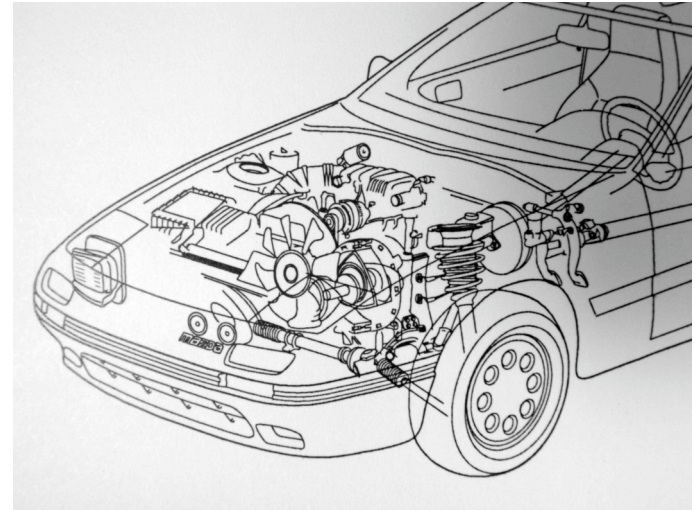
Lines

HP LJ 1320

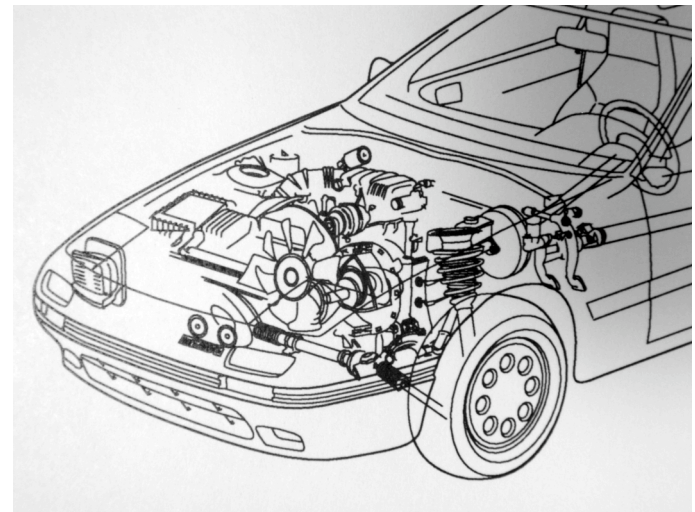
- Lines are smooth and rendered correctly at requested thicknesses
- Radial Lines and Reverse Radial Lines are sharper and clearer than those produced by Dell 1700
- Intricate line details are faithfully rendered, as seen on the engine block assembly of the Mazda car drawing, on the "Color Spectrum" file

Dell 1700

- Lines are rendered too thick resulting in loss of image details
 - 300 dpi and 2400 dpi lines are produced with same thickness
 - Close proximity horizontal and vertical lines appear too close together, with just slight visible separation
 - Radial Lines and Reverse Radial lines are not as sharp as those on HP LJ 1320
 - Fine line details on the engine block and radiator grill of the car drawing are lost
- Minor stepping and jaggedness is visible in NORMAL mode
 - Lines rendered in BEST (1200 dpi) mode are smoother
- All Lines in the Mazda Car Drawing have uniform thickness resulting in perceived loss of image depth



HP LJ 1320



Dell 1700



Print Quality Analysis Results (cont'd)

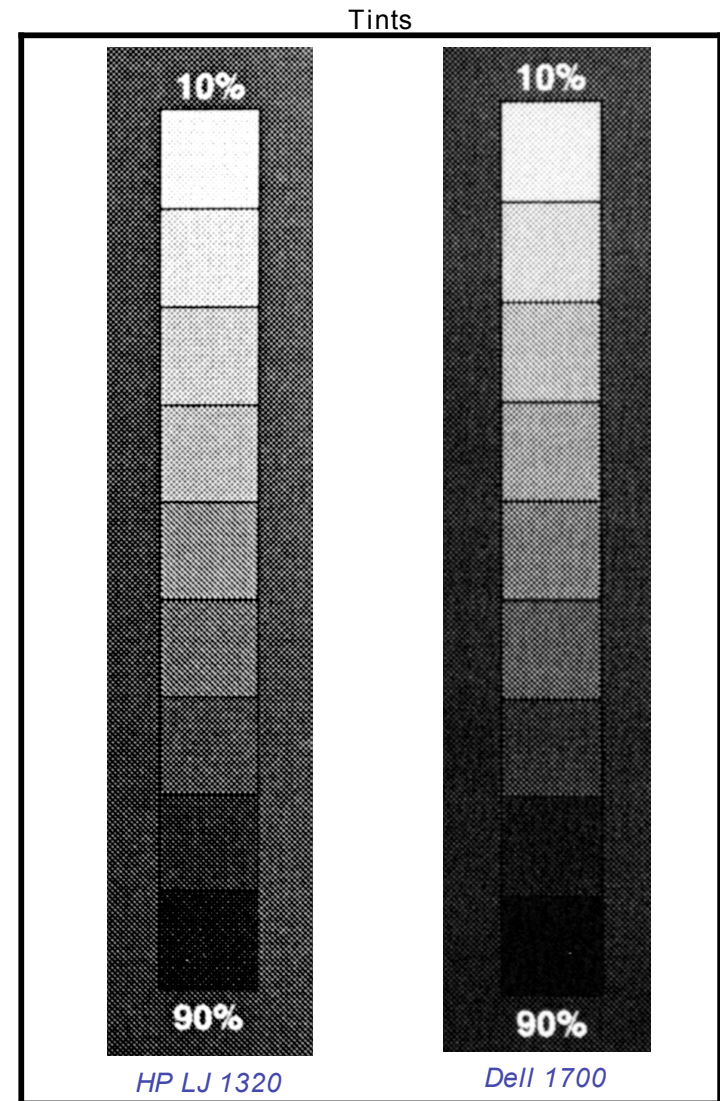
Tints

HP LJ 1320

- ° *Tints have excellent smoothness when compared to Dell 1700*
- ° *Free from banding, mottle and grain*
- ° *Tints have good differentiation at varying percentages*

Dell 1700

- ° *Tints exhibit banding in machine direction*
 - No visible mottle
 - Grain and screening visible under magnification
- ° *Saturated Tints are rendered a bit too dark*
- ° *Hardly any visible discrimination between 80% and 90% Tints*



Blends

HP LJ 1320

- ° *Blends have very smooth, consistent transitions*
 - No graininess or screening patterns visible

Dell 1700

- ° *Blends exhibit limited transitions*
 - Shadow Blends appear plugged and midtones are lost
 - Visible banding in machine direction



Print Quality Analysis Results (cont'd)

Images

HP LJ 1320

- Overall Image Quality is superior to Dell 1700
- Images are extremely smooth with no visible banding, mottle or grain
- Fine image details are faithfully rendered with exceptional clarity
 - Shadow details, as on the *LaBoca*, *Castle*, and *Enhanced Black* (Woman's Headshot hair detail at right) files, are visible
- Extremely high color differentiation on halftone color images
- Images at times are rendered a bit too light, appearing 'washed-out' and lacking highlight region definition



HP LJ 1320

Dell 1700

- Images have good definition and sharpness
- Images are fairly smooth
 - Free from visible print artifacts, banding, mottle and grain
- Images are rendered a bit too dark, with hardly any color differentiation rendering it difficult to distinguish fine image details
 - Low contrast
 - Resulting darkness leads to loss of shadow and highlight details, as seen on the *Castle* and *Enhanced Black* file's Woman's Headshot image (see sample at right)
 - Fine shadow details are lost and appear solid black as seen in the *LaBoca* and *Enhanced Black* file's Woman's Headshot



Dell 1700



Toner/Drum Yield and Cost-per-Print Summary

The Full Toner/Drum and Cost-per-Print Report: *Monolasers: HP LaserJet 1320 vs. Dell 1700* is available for download at <http://www.spencerlab.com>. Results are summarized in the following section.

Methodology

Toner cartridge yield testing complied with ISO/IEC 19752:2004

Drum Yield testing

ISO 19752 test procedures adapted; no ISO standard for drum yield available

Cost-per-Print

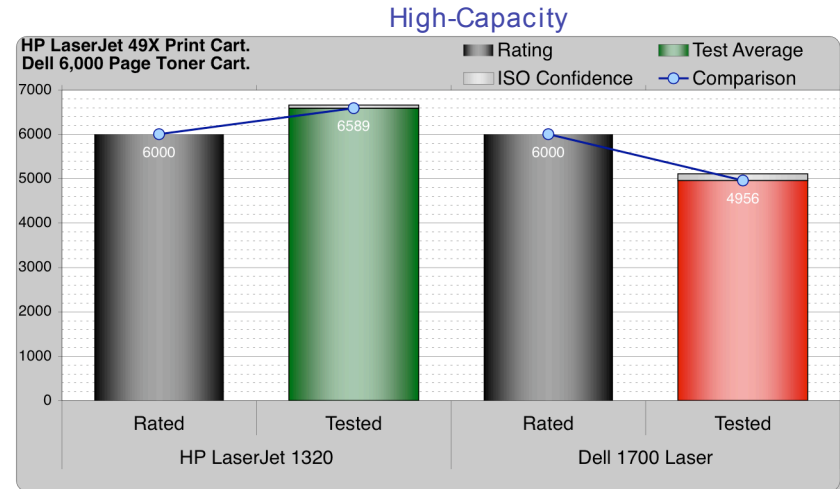
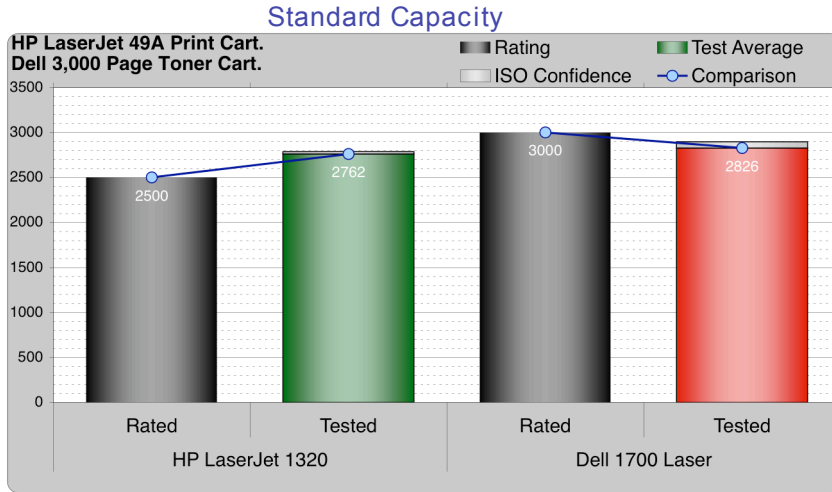
Toner Cartridge Cost divided by Declared Page Yield

° *Plus Drum Cost divided by Declared Drum Page Yield*



Toner/Drum Yield Summary

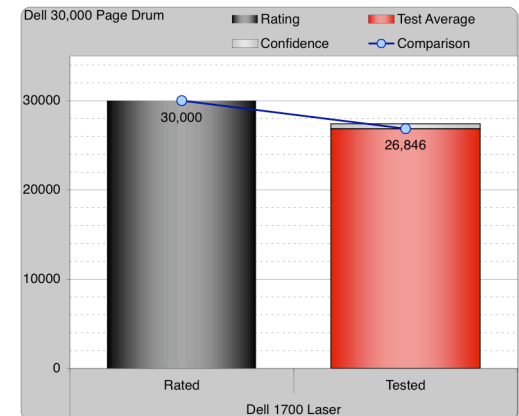
Toner Cartridge Yield - Test Results vs. Manufacturer's Ratings



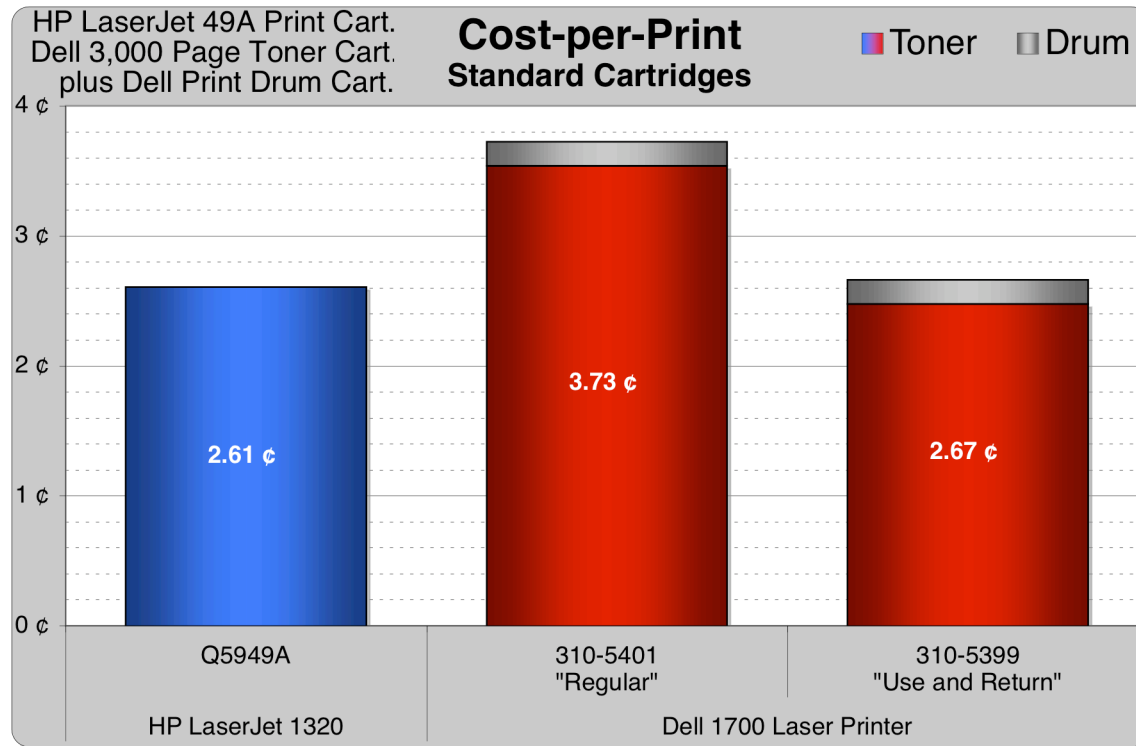
° While HP exceeded its rated yield by 10% on both cartridges, Dell tested below its Rated Yield on both (-6% and -17%)

Drum Yield

° Dell printers indicated drum End-of-Life 11% short of Rating



Cost-per-Print Summary — Standard Cartridges



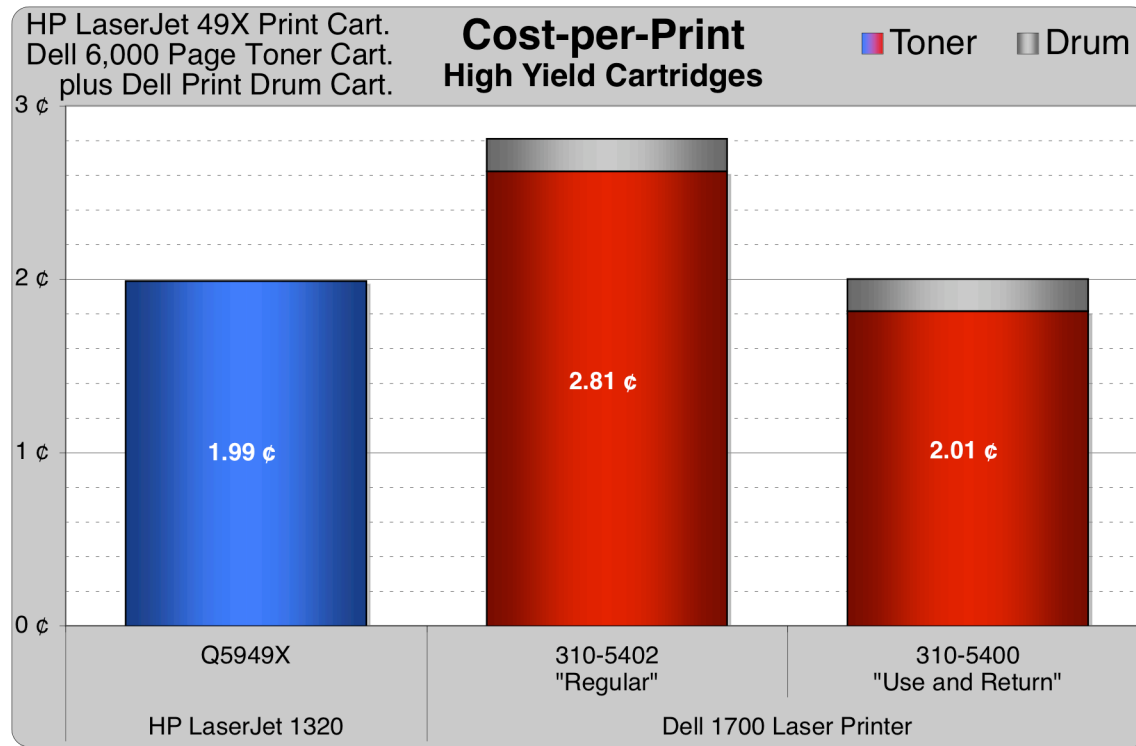
Dell Standard Toner and Drum Cartridges yielded higher Cost-per-Print than HP

Dell's "Use and Return" Cost-per-Print was 2% more expensive than HP

Dell's "Regular" cartridge Cost-per-Print was 43% more expensive



Cost-per-Print Summary — High-Yield Cartridges



Dell High-Yield Toner, Drum Cartridges yielded higher Cost-per-Print than HP

Dell's "Use and Return" Cost-per-Print was 1% more expensive than HP

Dell's "Regular" cartridge Cost-per-Print was 41% more expensive



Ease-of-Use Findings

Installation

◦ *Easy installation for both HP LJ1320 and Dell 1700 printers*

- Both printers ship with easy-to-understand setup poster and CD-ROM containing all required printer drivers/software
- Simple, easy to follow on-screen installation instructions
 - *HP LJ 1320 came with only CD-ROM based User Guide*
 - *Dell 1700 shipped with a printed Owner's Manual; however this guide differed in content from the HTML version available at Dell web site*

Information based on respective printer User/Owner's Manual

Control Panel

◦ *HP LJ1320 and Dell 1700 have fairly descriptive Control Panels*

- Provide information, including but not limited to, Toner Low, Paper Jams, Paper Out and Printer Errors
- On Dell 1700, pressing the Continue button when the Printer is in Ready mode prints the 'Printer Configuration/Setup Page'
 - *Results in unnecessary waste of consumables and personnel time*
 - *HP requires user to hold the Go button for five to ten seconds, avoiding this issue*

Printer Driver/Software

◦ *HP LJ 1320 supports the following operating systems*

- Windows XP (64-bit) (printer driver only), XP (32-bit), Server 2003, 2000, NT (printer driver only), Me, 98,
- Mac OS X v10.2 and later, v10.1 (printer driver only), Mac OS 9.x (printer driver only)

◦ *Dell 1700 supports fewer operating systems*

- Windows XP, 2000, NT, Me (some Dell Printer Software features unavailable), 98 SE (some Dell Printer Software features unavailable)

◦ *Dell 1700 does not support Mac OS*

Findings based upon evaluators' experiences during testing of multiple HP LJ 1320 and Dell 1700 printers during testing specific to this report in addition to during referenced Cost-per-Print testing. Some information based upon respective printer User/Owner's Manual.



Ease-of-Use Findings (cont'd)

HP LJ 1320

- *Requires complete software utility installation*
- *All features and functions available whether printer is connected directly to a computer or a network*
- *Following tasks can be performed*
 - Checking printer status
 - Configuring printer settings
 - View online documentation and troubleshooting information
 - Ordering supplies
- *Embedded Web Server*
 - Feature available only on network models

Dell 1700

- *Dell offers a limited number of utility options, dependent upon connectivity*
 - Status Monitor Center
 - *Not available when the printer is connected locally*
 - Printing Status Monitor
 - *Not available when the printer is connected to a network. Only functions when printer connected directly to the computer*
 - *Displays Printer Status, Toner Level and Job title/name when a job is sent to the printer*
 - Printer Supplies Reorder Application
 - Dell Local Printer Settings Utility
 - *This utility is used to modify printer settings not available from the printer driver*
 - *Not available when the printer is connected to a network. Only functions when printer connected directly to the computer*
 - Driver Profiler
 - *Allows users to create custom driver settings for items such as... Print orientation, Installation status of output tray, Custom paper sizes, Simple text and watermarks, Overlay and Font references, Form associations*
 - Dell Printer Configuration Web Tool
 - *Feature available only on network models*



Ease-of-Use Findings (cont'd)

Printer Driver/Software ...


° *HP LaserJet 1320 offers interactive Help on Printer Status Lights (see illustration on right)*

- A particularly useful feature which helps user to understand Control Panel Lights easily and quickly
- Available on the printer driver under Services Tag
 - *User simulates condition on printer control panel*
 - *The Condition along with recommended action is displayed*
- Eliminates the need to refer to documentation and troubleshooting information (online or printed)

° *On Dell 1700, deciphering Control Panel light sequences was particularly difficult due to inconsistencies between the Printed and PDF Owner's Manual vs. the online HTML guide*

HP Interactive Help

Primary light patterns




Instructions

1. Click the control panel lights to create the condition you are experiencing.
2. Click "check condition" to read the condition and recommended action.

» Check condition

» Show labels

Primary light patterns



Condition

The print cartridge is low.

Recommended action

Order a new print cartridge.

The Print Cartridge light might be on by itself or at the same time another light is on or blinking. If another light is also on or blinking:

1. Turn the Print Cartridge light off in the simulator.
2. Turn the other light to the on or blinking state to isolate the other condition.

» Show labels



Ease-of-Use Findings (cont'd)

Functionality

◦ *Automatic Duplexing on HP LJ 1320 is a significant advantage*

- HP LJ 1320 has a single-click Automatic Duplexing feature
 - *Available as an option within the printer driver*
- Dell 1700 offers a Manual Duplexing option from the printer driver
 - *Requires human intervention*
 - *After printing one side, paper has to be removed from the output bin and loaded printed side up into the input tray*
 - *The final duplexed output exhibited paper wrinkling and roller marking during testing*
 - *Manual Duplexing results in longer printing times and increased user intervention when printing of duplexed documents on the Dell 1700 when compared to HP LJ 1320*

◦ *Paper Level Indicator*

- HP LJ 1320 has paper level indicator located at the front of the paper tray
 - *This slider becomes a useful utility, forewarning if there is sufficient paper in the tray to complete a print job*
- Dell 1700 does not have this feature on either the standard 250-sheet drawer or the optional 550-sheet drawer
 - *A user will have to assure that the drawers contain enough paper to complete the job or physically check the paper levels in the sheet drawers*

◦ *Toner Low Warning*

- HP LJ 1320 Toner Low warning appears when approximately 15% of toner is remaining in cartridge
- Dell 1700 Toner Low warning appears when approximately 30% of toner is remaining in cartridge
 - *Toner should be replaced upon Toner Out signal or print quality degradation, not at Toner Low signal - doing such could waste up to 30% of toner*

Technical Support

◦ *HP support was not required during this testing*

◦ *Dell Technical Support (telephone) was sought, but unable to assist on most printer-usage related issues*

- *User Manuals did not provide complete information, including but not limited to explanations of Print Quality modes and usage, Advanced Print settings (i.e. What is Custom 2400IQ?) and Printer errors. Calls were placed to Dell support, however personnel were not able to answer such inquiries*
- *Dell Technical Support staff were able to provide troubleshooting assistance limited to printer installation and troubleshooting driver/printer software setup issues, but not inquiries as listed above*
- *Dell Technical Support had long wait periods*
- *Observations based on multiple calls placed at various times*



Ease-of-Use Findings (cont'd)

Reliability

Printer Failure

- *No printer failures were experienced on the tested HP LJ 1320 printers*
- *Printer failure occurred on two tested Dell 1700 printers*
 - Occurred during installation and during testing
 - Printers could not be repaired and were shipped back to Dell for replacement
 - One Dell printer failure occurred during installation: issue with the front door sensor
 - *the error light was lit and the printer did not function*
 - The second Dell printer failure occurred during testing: plastic output roller warped
 - *The warped output roller caused paper jams to a point where printing became impossible*

Paper Jams

- *No paper jams occurred on any of the tested HP 1320 printers*
- *Frequently annoying paper jams occurred on Dell 1700 printers*
 - These paper jams were not a result of operator error or any structural paper defect
 - *Care was taken to ensure that paper was loaded as per printer manufacturer's recommendations*
 - *Media was cured for at least 8 hours under test temperature and humidity as per ISO methodology*
 - *Media was checked for any defects - tears, paper wrinkles, curls etc. before feeding into the printer*
 - Frequent paper jams on the Dell 1700 resulted in longer printer downtime and higher human intervention when compared to the HP LJ 1320



Ease-of-Use Findings (cont'd)

General Observations

- *During semi-continuous printing, the Dell 1700 tends to overheat*
 - This results in higher frequency of paper jams and other printer problems such as warping of the plastic parts, such as output roller
- *Dell 1700 is noisier when compared to HP LJ 1320*
 - Under normal operational, the Dell 1700 is noisier than the HP LJ 1320
 - One of the tested Dell 1700 printers exhibited an additional noise caused by the output roller
- *All 10 tested Dell printers were recalled by the manufacturer*
 - The problem was identified as a potential electrical shock hazard to users
 - Dell recommended unplugging all 1700/1700n printers, discontinue any further use, and arrange for replacement printer through Dell
- *Dell 1700 had more downtime and required greater human intervention than HP LJ 1320*
 - Even though Dell 1700 printers are rated at higher print speed (up to 25 ppm vs. HP 1320 up to 22 ppm), frequent printer stops due to paper jams and other miscellaneous errors (such as PCL errors and printing of blank pages) resulted in lower net printed pages for a specified amount of time
- *HP's Instant-on fuser Technology allowed for faster First Page Out times*
 - Provided equivalent timings of test documents, irrespective of wait time interval (i.e. 5 min, 15 mins, 30 min, or overnight)



Thank You — The *SpencerLab* Project Team

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