

Competitive Ink Comparison Study – North America

Original HP InkJet vs. Non-HP Refilled and Remanufactured Cartridges

The **spencerLAB** DIGITAL COLOR LABORATORY has conducted cartridge reliability comparison testing of original HP Inc. [HP] inkjet cartridges, four (4) non-HP brands of Remanufactured ink cartridges, and four (4) non-HP brands of Refill retailers/Refill ink kits sold as substitutes in North America (NA). The study included testing of HP #61XL, #62XL, #63XL, #564XL, #950XL, #951XL, #970XL, and #971XL cartridge SKUs. All cartridges were sourced in North America.

The non-HP brands included Remanufactured cartridges from: Cartridge World, Double Inks, LD Products, and Inkjet Superstore; Refilled cartridges from retailers: Cartridge World, Costco, Fry's Electronics, and Ink & Toner. Ink cartridge SKUs that were not able to be refilled at retail locations were refilled by **spencerLAB** technicians using commercially available ink Refill kits from Dinsink, Ekuten/Pro Ink Shop, Ink Owl, and R-Jet Tek.

Nine (9) cartridges for each brand and SKU were allocated for testing to obtain representative results. A total of 1,458 cartridges were run on 46 printers, entailing over 2,000 testing hours, in which a total of 1,922,792 pages were printed across all tested brands.

The analysis compared the Page Yield, Reliability, Wasted Pages, and Printer Damage throughout the life of the ink cartridge models tested for each brand. Cartridge Reliability factors, such as Dead-on-Arrival (DOA) and Premature Failure (PF) [see definitions in Appendix 2], were evaluated to determine the total number of Problem Cartridges. Print Quality and Printer Damage issues were also considered.

KEY FINDINGS

- Original HP ink cartridges tested yielded an average of 111%, or more than 2 times greater pages than non-HP tested cartridges.¹
- Original HP ink cartridges tested showed no Problem Cartridges, whereas 58% of non-HP ink cartridges tested exhibited Dead-on-Arrival or Premature Failure.
- HP ink cartridges produced 29 times fewer Wasted Pages than non-HP cartridges.
- Original HP ink cartridges did not cause any printer damage, whereas non-HP cartridges destroyed several printheads on the HP Officejet Pro and Photosmart Plus printer models, which caused irreparable printer damage during testing, costing several thousands of dollars for replacements. 31% of tested printers were permanently damaged by non-HP inks.

¹ To account for reliability-driven cartridge issues, defective and failed cartridges were included in the page yield calculations. Consequently, the reported page yield numbers are not based on ISO/IEC 24711 Standard methodology, as it requires that defective cartridges be excluded from page yield calculation.

TEST RESULTS

PAGE YIELD

A total of 162 original HP cartridges and 1,296 non-HP cartridges, including Remanufactured and Refilled, were tested. Black and Color cartridge yields were combined to determine an overall average.

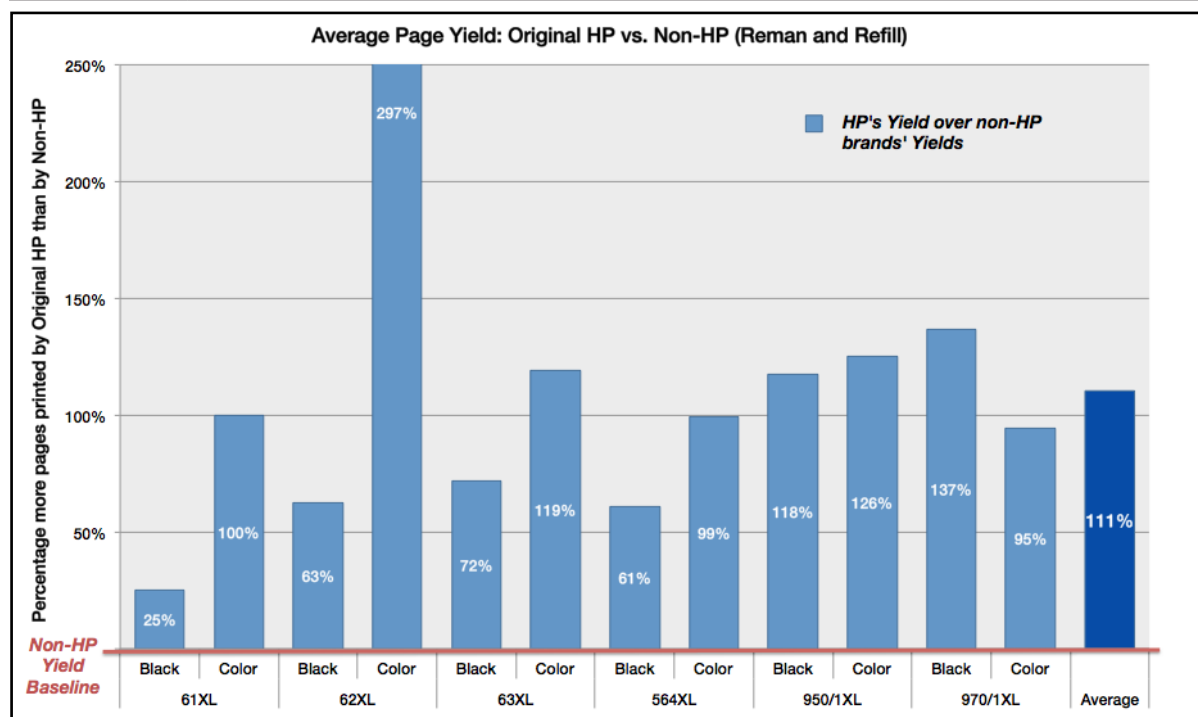
Testing concluded that the Original HP cartridges produced an average of 111% more pages than the non-HP cartridges tested. The tested non-HP ink printed (on average) 49% fewer pages than Original HP ink cartridges tested.

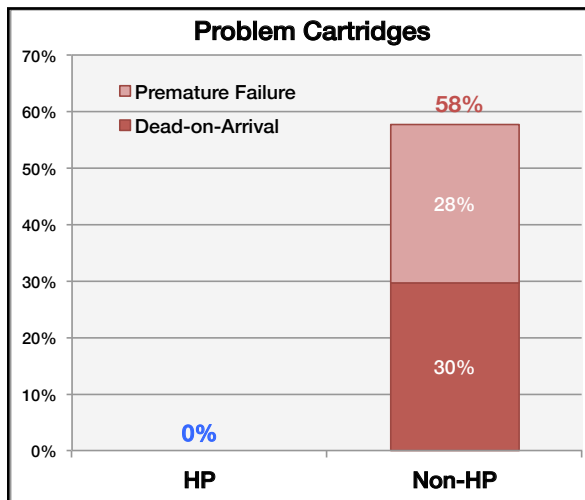
For all individual colors and SKUs tested, original HP cartridges yielded more pages

than non-HP brand cartridges. On cartridge yields, HP cartridges delivered more than 707 printed pages on average than non-HP cartridges (i.e. over two times, or more than 100% greater the number of printed pages than non-HP cartridges). The chart below shows the average percentage of additional pages produced by original HP cartridges over non-HP cartridges, for each SKU and Color category tested.

The yields of individual CMY color cartridges (Cyan, Magenta, and Yellow) were averaged to calculate an average Color yield for 564XL, 951XL, and 971XL SKUs.

Page Yield Comparison		
Cartridge Brand	Number of Cartridges Tested	Average Percentage More Pages Printed by HP Cartridges
HP	162	111%
Non-HP	1,296	





CARTRIDGE RELIABILITY

Original HP ink cartridges tested as more reliable than the non-HP tested brands; none of the original HP cartridges were deemed as Problem Cartridges (DOA or PF).

All HP cartridges completed the tests without any cartridge or printer failures.

There were no DOA or PF cartridges for original HP supplies; however, a majority of the non-HP Black and non-HP Color cartridges tested experienced either DOA or PF. The non-HP tested cartridges exhibited Reliability issues before, during, and after installation.

Of the 1,296 non-HP cartridges tested, 58% were deemed Problem Cartridges and were either Dead-on-Arrival (DOA), or Premature Failure (PF), both of which determined an early End-of-Life.

Thirty percent of the tested non-HP cartridges were DOA, and 28% expired prematurely (PF). Common causes of DOA

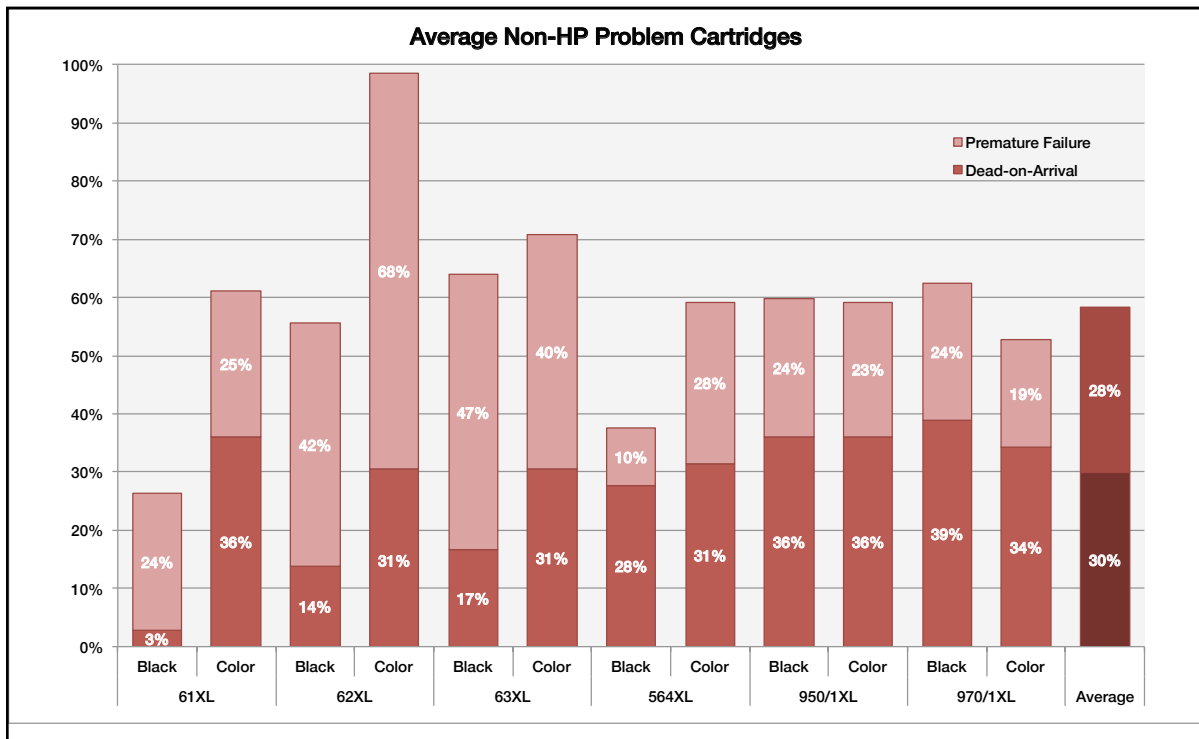


**NON-HP REFILL CARTRIDGE:
SEVERE INK LEAKAGE DURING REFILLING PROCESS**

included printhead and printer damage, poor Print Quality with defects such as color mix and streaking, ink leakage, incompatible cartridges not being recognized upon installation, or missing parts.



NON-HP REFILL CARTRIDGE INK LEAKAGE



Premature Failure included low yield cartridges (provided less than 75% of HP stated yield for that cartridge SKU), or cartridges that caused printhead or printer damage, or displayed poor print quality (such as streaking and color mix).

The chart above shows the DOA and PF cartridge breakdown for each color and SKU tested. The individual color cartridge (Cyan, Magenta, and Yellow) percentages were averaged for 564XL, 951XL, and 971XL SKUs.



**NON-HP: UNUSABLE PRINT QUALITY
DUE TO PRINthead DAMAGE**

USER EXPERIENCE

- *Non-HP brand cartridge orders were often subject to cancellation due to unavailability, and some sellers cancelled orders without providing any reason*
- *Some non-HP vendors shipped varying brands of cartridges for colors of the same cartridge SKU type*
- *One retail cartridge refiller started the refill process and stopped midway due to insufficient supply of electronic chips, causing weeks of delay in order fulfillment*

WASTED PAGES

The non-HP cartridges produced 13,681 Wasted Pages (0.91% of total non-HP pages), whereas original HP ink cartridges produced only 118 Wasted Pages (0.03% of total HP pages). Out of the total non-HP wasted pages, Remanufactured ink cartridges produced 8,013 and refilled cartridges produced 4,862 Wasted pages. Overall the non-HP cartridges produced over 29 times more Wasted Pages than HP cartridges. On average, original HP inks produced 29 times fewer Wasted Pages than non-HP inks tested.

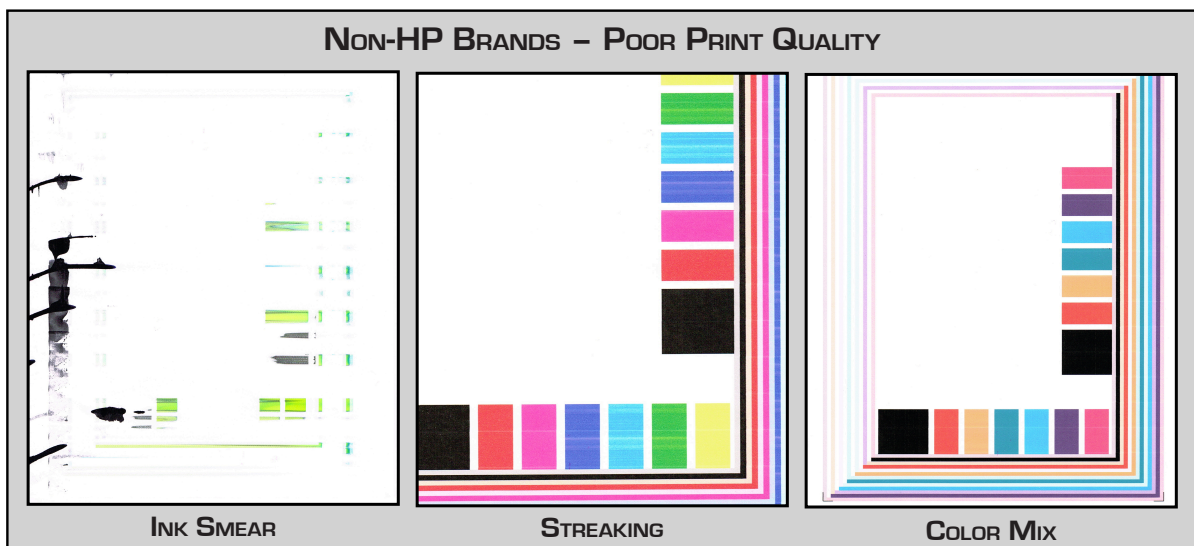
Wasted Pages include pages that display noticeably poor print quality, with defects such as streaking, color mix, ink



NON-HP CARTRIDGE INK LEAKAGE

smear, blurred characters, etc. Additional alignment pages required as a result of user interventions, and cleaning pages required as a part of a poor print quality recovery process, are also considered Waste Pages.

Wasted Pages Comparison			
Cartridge Brand	Total Pages Printed	Wasted Pages	% Wasted Pages
HP	385,401	118	0.03
Non-HP	1,511,259	13,681	0.91
Remanufactured	994,883	8013	
Refilled	516,376	4862	



NOTE: IMAGES MAY NOT BE ACCURATELY REPRODUCED WHEN PRINTED FROM THIS REPORT.

PRINTER DAMAGE

The Original HP ink cartridges did not damage any of the printers used throughout the testing process. Thirty-one percent of tested individual ink cartridge printers used for testing after-market brands were damaged by the use of non-HP inks. Such printer failures would cost customers both time and money to replace.

Printhead Damage Caused by Remanufactured Cartridges for 950XL/951XL

Several non-HP brands of 950XL/951XL cartridges tested on the HP Officejet Pro 8610 produced unusable pages due to print quality defects, specifically noticeable in color text of the test suite. These defects manifested as blurred, almost illegible color text, which was determined to be a result of printhead damage caused by the cartridge. These defects were observed on both Remanufactured and Refilled cartridges for this SKU.

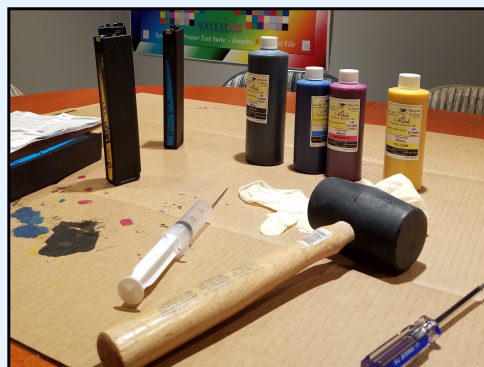
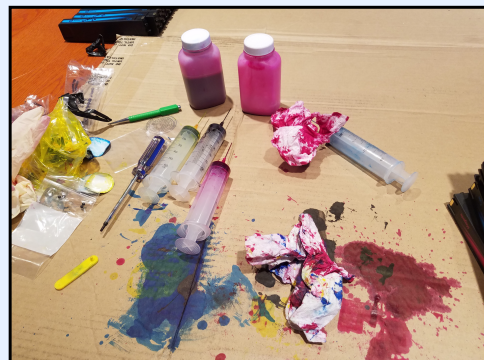


PRINthead DAMAGE CAUSED BY NON-HP INK

Once a defective print was produced, cleaning procedures were performed on the test cartridges as per ISO standards; however, Print Quality did not improve following the cleanings. The non-HP cartridges were then replaced with original HP cartridges to verify that the defect was still present, confirming that it was indeed a printhead failure caused by the tested non-HP cartridges. At this point, End-of-Life for the non-HP test cartridges' printer was declared. The cartridges were then removed and a new printhead was installed. A total of twenty-five test pages

USER EXPERIENCE

- *DIY Ink Refill kits require several hours of messy work and often failed either during the refilling process or prematurely while in use*

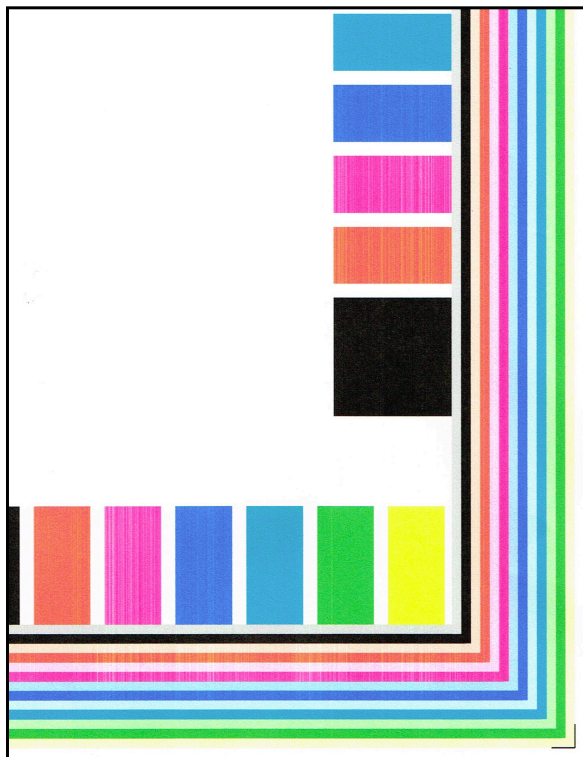


were printed with the Original HP Starter Cartridges supplied with the printhead to verify that the new printhead was in perfect working condition. The next set of fresh test cartridges were then inserted for testing with the newly installed printhead.

This procedure was repeated upon the start of the test for each of the non-HP brands in order to ensure that the printheads in place did not sustain damage during the prior testing.

Printhead Damage Caused by Refill Kit for 950XL/951XL SKU

SpencerLAB experienced severe issues with three of the four Refill kit non-HP cartridges. None of the pages of the test suite successfully printed for the 950/951XL SKU



NON-HP POOR PRINT QUALITY DUE TO PRINthead DAMAGE

USER EXPERIENCE

- *Some of the non-HP Ink Refill kits arrived with missing and/or wrong parts*
- *Contacting the non-HP vendor via phone and leaving several voice messages and sending many emails to report the issue resulted in no response for over a week, causing significant delays*
- *Several Ink Refill kits arrived with leaking bottles of ink, wasting a portion of expected ink volume ordered*
- *Often there were no instructions provided on how to refill the ink cartridges*

using Refill kit cartridges. Ink smeared all over the page when printing with the refills. These cartridges were declared DOA, as not a single test suite printed properly. The printheads were inspected by *spencerLAB* technicians, and each printhead was ultimately declared damaged by the Refill cartridges' usage.

For some of the non-HP Refill kit brands, after testing three sets of Refilled cartridges on three separate printers and experiencing printhead damage on all, it was concluded that all cartridges would cause the same failure, costing the user several hundreds of dollars. Therefore, the remaining test cartridges for the brand were declared DOA, as no typical user would continue to use such cartridges after experiencing continued failures.

The replacement of the damaged printheads due to faulty cartridges for the Officejet Pro 8610 is a costly repair for users; each printhead retails for \$120 (plus tax and shipping). The replacement (part number CR322A) requires ordering, which results in printer downtime. In order to satisfy testing requirements, *spencerLAB* procured an additional 65 spare printheads, totaling over \$7,800.

Printer Damage Caused by Non-HP 970XL/971XL Refilled Cartridges

Three of the four tested non-HP Refill kits used for refilling the 970XL/971XL cartridges also caused significant printer damage. This damage affected all OfficeJet Pro X451dn printers used for testing these three brands of Refill kits.

The defects caused by these non-HP Refill brands appeared as banding or streaking, seen on the diagnostic page of the test suite. These defects began to appear at considerably inconsistent page counts both across and within tested brands. Upon noticing the defects, *spencerLAB* technicians performed three levels of cleaning, as suggested by the printer manufacturer, HP. After performing the cleaning, with the test cartridges still in place, twenty-five pages (five test suites) were printed to evaluate print quality. If defects remained, original HP cartridges were inserted to determine if there was printer damage. If the defects still remained on the test suite

pages, an additional three levels of cleaning were performed with the HP cartridges in place. After cleaning, twenty-five pages (five test suites) were printed with the HP cartridges, and if the defect still remained, it was determined by *spencerLAB* that the non-HP cartridges had caused irreparable damage to the printers. As this particular printer model does not have customer replaceable parts, End-of-Life was called for the test cartridges. After three failures on three separate printers, the remaining test cartridges for the brand were declared DOA, as no typical user would continue to use such cartridges after experiencing continued failures.

Such catastrophic damage caused by non-HP brands would result in a customer having to replace the printer. The HP Officejet Pro X451dn printer is currently available for purchase through third-party sellers such as Amazon, retailing for \$600-\$650. A total of 12 printers were damaged by third-party Refill brands, which in total would have cost \$7,200-\$7,800 to replace, resulting in unnecessary additional costs for consumers.

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THE *spencerLAB* DIGITAL COLOR LABORATORY

Through more than two decades of industry service, SPENCER & ASSOCIATES PUBLISHING, LTD. has earned a premier reputation for its expertise in evaluating digital color imaging and printing. Its independent test division, the *spencerLAB* DIGITAL COLOR LABORATORY, is internationally recognized as a leader in unbiased, third-party research and comparative analysis of digital imaging and printing system performance; the laboratory strictly adheres to the integrity of its methodology, even in commissioned studies. *SpencerLAB* provides leadership in quantitative and qualitative comparisons, benchmarking key performance metrics of digital printing systems in all technology classes, from desktop printers to digital color presses – providing research and evaluation services, compliance certifications, benchmark test software/hardware, and focus group management.

Leading vendors and firms for whom printing is mission-critical rely upon *spencerLAB* to provide strategic support and benchmarking of Print Quality, Ink/Toner Yield and Cost-per-Print, Throughput, Availability, Reliability and Usability for ink- and toner-based as well as other printing technologies. Corporate users rely upon *spencerLAB* for guidance in print system acquisition and usage optimization.

For more information, please visit www.spencerlab.com.

APPENDIX 1: METHODOLOGY

TEST PARAMETERS

The test included original HP Inkjet cartridges, four (4) non-HP brands of Remanufactured ink cartridges, and four (4) non-HP brands of Refill cartridges/ Refill ink kits sold as substitutes in North America (NA). All original HP and non-HP cartridges, and all test printers were acquired by *spencerLAB* either through retail, online, or direct channels. All testing activities were conducted at the *spencerLAB* DIGITAL COLOR LABORATORY in Melville, NY. The table below shows the various SKU and Printer combinations used for testing.

In order to obtain user-representative results, printers and cartridge SKUs from a wide range of HP's current and older

generation product portfolio were selected for testing. These printers and SKUs represent a large portion of products currently in use in the market. Since the tested cartridge SKUs are compatible with several HP printer models, the user experience reported in this study would be representative of all compatible printer models [see table in Appendix 3]. Nine (9) cartridges of original HP, and each non-HP Remanufactured and Refill brands for each cartridge SKU, were tested.

This study tested average performance of the market, not individual brand performance. The brands and providers selected are commonly available and make up a large portion of the overall market for Remanufactured and Refilled ink cartridges and Refill kits in North America.

Cartridge Model/SKU	Cartridge Type	Test Printer
#61XL	Black	HP Deskjet 2549 All-in-One
	Tri-Color (CMY)	
#62XL	Black	HP ENVY 5660 e-All-in-One
	Tri-Color (CMY)	
#63XL	Black	HP ENVY 4520 All-in-One
	Tri-Color (CMY)	
#564XL	Black	HP Photosmart Plus All-in-One B209a
	Cyan	
	Magenta	
	Yellow	
#950XL	Black	HP Officejet Pro 8610 All-in-One
#951XL	Cyan	
	Magenta	
	Yellow	
#970XL	Black	HP Officejet Pro X451dn
#971XL	Cyan	
	Magenta	
	Yellow	

Non-HP Brands Tested		
Remanufactured	Refilled	Refill Ink kits**
Cartridge World	Costco	Dinsink
LD Products*	Cartridge World	Ink Owl
Double Inks	Fry's Electronics	R-Jet Tek
Inkjet Superstore (G&G)	Ink & Toner	Ekuten/Pro Ink Shop
*For the 564XL SKU, LD Products cartridges received were G&G brand, and not the LD Products brand we received for all other SKUs		
**SKUs that were not available for refilling at retail service providers were refilled by <i>spencerLAB</i> technicians using commercially available Refill kits		

To fairly represent the Refill cartridge user experience, original HP cartridges were depleted by printing to the first very low signal or first sign of fade, whichever was earlier. These depleted cartridges were then refilled at refill service provider locations. This process ensured that all cartridges tested as Refills were only refilled once. Pages printed while depleting the original HP cartridges for refilling were not included in the test. When retail refill service providers did not support refilling of a SKU, Refill ink kits were procured as substitutes. To gather diverse user experience, multiple *spencerLAB* technicians refilled the cartridges using the instructions provided with the Refill kits. Some Refill kits did not include instructions, and if the retailer could not provide any upon contacting them, instructions were obtained via an Internet search of cartridge refill instructions for that cartridge SKU. Additional spare cartridges were purchased, depleted, and refilled to accommodate the anticipated staggered timing of black and color cartridge End-of-Life, and for use as spares to continue testing when any other

test cartridges experienced Premature Failure or reached End-of-Life.

Multiple printers were used to test each brand to obtain user-representative results. Additional new printers and printheads were acquired to replace damaged units as needed.

Printing was performed in a continuous manner, with stops for paper replenishment, overnight, etc., until ink cartridges reached End-of-Life [see definition in Appendix 2]. All test supplies, such as printers, ink cartridges, and paper, were acclimated to normal office testing environment for at least 12 hours prior to testing (environmental conditions specified in ISO/IEC 24711). The ISO/IEC 24712 five-page color test suite was printed from a Windows 10 operating system using Acrobat Reader DC 2017.012.20093. Test files were printed in printer default mode for plain paper, on Hammermill Copy Plus 20lb., 92 Brightness, office paper. All test printing was performed by *spencerLAB* technicians at the Melville headquarters.

The HP Deskjet 2549 printers (61XL), HP ENVY 5640 printers (62XL), and HP ENVY 4520 printers (63XL) all employ two print cartridges (black and tri-color), while the HP Photosmart B209a printers (564XL), HP Officejet Pro 8610 printers (950XL/951XL), and the HP Officejet Pro X451dn printers (970XL/971XL) use four print cartridges – Black (K), Cyan (C), Magenta (M), and Yellow (Y). In order to reconcile the individual color cartridge data for the 564XL, 951XL, and 971XL model individual cartridges with data of the 61XL, 62XL, and 63XL tri-color cartridges, the overall yields of the CMY individual color cartridges were averaged together before aggregating into summary results. Additionally, to replicate typical user experience with failed and/or defective cartridges, the defective cartridges were included in the page yield calculations reported.

A total of 162 Original HP cartridges were tested, and a total of 1,296 non-HP cartridges were tested. All sources, including remanufacturers and refillers, were located in North America.

CARTRIDGE RELIABILITY TESTING

Prior to printing, all cartridges were carefully unpacked and inspected for any ink leakage and/or broken parts; all DOAs were noted and photographed. If any tested brand caused three (3) printer or printhead failures, the remaining test cartridges of



spencerLAB TESTING IN PROGRESS

that brand for that printer model were considered Dead-on-Arrival with zero yield. This assumes that the typical user will not have several spare printers and/or printheads available to continue printing and even if they did, they would perhaps refrain from using any spare cartridges of that brand after experiencing such major failures.

PRINT QUALITY ASSESSMENT

Print quality assessments were made throughout the running of all the test cartridges.

The number of Wasted Pages was calculated from the sum of the secondary cartridge alignment pages, pages printed during the printhead cleaning processes, and unusable pages due to print quality issues.

Secondary cartridge alignments are any alignments performed following the initial alignment performed upon installation of the first set of cartridges. Contrary to Original HP cartridge performance, some non-HP brands randomly suggested performing alignments during the middle of testing, and this output was considered Wasted Pages. Pages for initial alignments are not included in the Waste Page calculation because this process is printer-initiated and common across all brands.

When print quality of printed output deteriorated, exhibiting issues such as streaking, banding, fade, etc., a printhead cleaning was performed. The number of allowable cleanings per cartridge set was per ISO/IEC 24711 guidelines, which are based upon cartridge stated yield.

If the print quality of the output improved to acceptable following the cleaning process, the test continued. If the print quality remained unsatisfactory, either additional cleanings were performed (within the cleaning limit number), or cartridge was deemed to be at End-of-Life.

End-of-Life determination could be made on a number of factors, including unusable output due to streaking, fade, banding, color mix, etc., or if a total of three sets of test cartridges of one SKU caused significant printhead damage, forcing replacement of the printhead or printer itself [see table in Appendix 2 for detailed definition].



NON-HP INK REFILLING PROCESS



REFILL KIT ARRIVED LEAKING

APPENDIX 2: TEST TERMS AND DEFINITIONS

Terms	Definitions
End-of-Life, (EOL)	A condition determined by one of six mechanisms: <ol style="list-style-type: none"> 1. Fade has occurred on the diagnostic page per ISO/IEC 24711 definition. 2. Significant reduction in density in the bands or blocks per ISO/IEC 24711 definition. 3. Streak removal procedure steps have been exhausted per ISO/IEC 24711 definition. 4. Significant ink leakage occurs before or during installation or any time during printing. 5. 10 consecutive pages contain color mix. 6. Cartridge fails to print or stops printing and efforts to recover are unsuccessful.
Page Yield	The number of Usable pages measured using the ISO/IEC 24712 five-page test suite where each brand and SKU is tested on a minimum of three printers with printers operating in factory default driver settings for “Normal” printing on plain paper.
Wasted Pages, (Unusable)	The number of Wasted Pages was calculated from the sum of the secondary cartridge alignment pages, pages printed during the printhead cleaning processes, and unusable pages due to print quality issues.
Individual Cartridge Yield	Calculated by counting the number of diagnostic pages printed between cartridge installation and end of life (EOL), then multiplying by five. The diagnostic page is the last page printed in the test suite. EOL is a condition determined by one of six mechanisms defined above.
Dead on Arrival, (DOA)	DOA has occurred when one of the four mechanisms below has occurred: <ol style="list-style-type: none"> 1. Cartridge found to have substantial leakage (as defined above) at start or during testing. 2. 10 or fewer pages printed by a cartridge when end of life occurs. 3. Cartridge fails to operate upon installation. 4. Out of box failure occurs.
Premature Failure, (PF)	PF has occurred when a cartridge has a page yield of less than 75% of the HP page yield specification for that cartridge model. Included causes may be printhead or printer damage, or out of box failure.
Print Quality	A visual print quality assessment of each page printed which, based on mutually agreed PQ rating criteria, will classify all pages as being either: <ol style="list-style-type: none"> 1. Good for all uses. 2. Unusable. 3. Printhead alignment page or print quality check page used after a printhead cleaning event.
Average % More Pages	Calculated by counting the average number of Usable pages printed.
Test Page Suite	A series of five pages that are printed consecutively in order as a single job, ending with a diagnostic page, as per ISO/IEC 24712.
Fade	A significant decrease in density on the bands or blocks of the diagnostic page. This decrease in density does not have to necessarily occur completely across the page, but was determined using a comparison to the second diagnostic page generated during testing (the 10th page printed).
Streaks	Very thin lines of color, other than intended, in the bands surrounding the edge of the last page in the test suite (the diagnostic page). Streaks can appear for a number of different reasons, including thermal issues and clogged nozzles.

APPENDIX 2: TEST TERMS AND DEFINITIONS (CONTINUED)

Terms	Definitions
Color Mix	A color cartridge that cannot correctly print the Cyan, Magenta, and Yellow colors as shown on the 5th page of the test suite (the diagnostic page). This occurs when ink unintentionally mixes inside the cartridge, which causes discoloring of the ink.
Printhead Cleaning	<p>The cartridge cleaning process used to restore print quality and performance. As streaks or other defects were observed, the streak removal procedures were executed according to HP printer manual instruction. When printing with non-HP cartridges, multiple levels of cleaning were required, but if performed, were counted as one individual cleaning. Any pages printed during the cleaning process were not counted in the overall page yield. Following a cleaning procedure, an additional test suite was printed, and verified by observing the diagnostic page.</p> <p>The maximum number of cleanings per SKU was calculated based on the overall HP page yield, as per ISO/IEC 24711. EOL was determined when the allowed number of cleanings had been exhausted, and an additional cleaning was required due to print quality defects.</p>
Substantial Ink Leakage	<p>If a significant amount of ink visibly spilled on either the plastic bag or box containing the cartridge, or ink spilled over the printhead nozzles, the leakage was recorded, and the cartridge was determined to be DOA.</p> <p>If a significant amount of ink spilled during the refilling process, leakage was recorded, and the cartridge was determined to be DOA.</p> <p>If a significant amount of ink leaked inside of the printer during testing, and caused a substantial visible defect on the printed pages, EOL was determined based on cartridge leakage. If the defect was not substantial enough to consider the printed pages Unusable, testing continued, and the defect was monitored and recorded.</p>

APPENDIX 3: COMPATIBLE PRINTERS

HP 61XL	HP 62XL	HP 63XL
HP Deskjet 1000 - J110c, J110d, & J110e	HP ENVY 5540	HP Deskjet 1110
HP Deskjet 1000 - J110d	HP ENVY 5541	HP Deskjet 1112
HP Deskjet 1000 - J110e	HP ENVY 5542	HP Deskjet 2130
HP Deskjet 1010	HP ENVY 5543	HP Deskjet 2132
HP Deskjet 1050 - J410a	HP ENVY 5544	HP Deskjet 3630
HP Deskjet 1051	HP ENVY 5545	HP Deskjet 3632
HP Deskjet 1055 - J410e	HP ENVY 5547	HP Deskjet 3633
HP Deskjet 1056 - J410a	HP ENVY 5548	HP Deskjet 3637
HP Deskjet 1510	HP ENVY 5549	HP ENVY 4512
HP Deskjet 1512	HP ENVY 5640	HP ENVY 4520
HP Deskjet 2000 - J210b & J210c	HP ENVY 5642	HP ENVY 4522
HP Deskjet 2050 - J510a	HP ENVY 5643	HP ENVY 4523
HP Deskjet 2510	HP ENVY 5644	HP ENVY 4524
HP Deskjet 2512	HP ENVY 5660 Wireless Photo with Mobile Printing, Instant Ink ready	HP Officejet 3830
HP Deskjet 2514	HP ENVY 5661	HP Officejet 3831
HP Deskjet 2540	HP ENVY 5663	HP Officejet 3833
HP Deskjet 2541	HP ENVY 5664	HP Officejet 4650
HP Deskjet 2542	HP ENVY 5665	
HP Deskjet 2543	HP ENVY 7640	
HP Deskjet 2544	HP ENVY 7645	
HP Deskjet 2546B	HP Officejet 200 Mobile	
HP Deskjet 2546P & 2546R	HP Officejet 250 Mobile	
HP Deskjet 2547	HP Officejet 252 Mobile	
HP Deskjet 2549	HP Officejet 252C Mobile	
HP Deskjet 3000 - J310a	HP Officejet 258 Mobile	
HP Deskjet 3050 - J610a, J610d, & J610f	HP Officejet 5740	
HP Deskjet 3050A - J611g	HP Officejet 5741	
HP Deskjet 3051A - J611h	HP Officejet 5742	
HP Deskjet 3052A - J611g	HP Officejet 5743	
HP Deskjet 3054 - J610a	HP Officejet 5744	
HP Deskjet 3054A - J611j	HP Officejet 5745	
HP Deskjet 3511	HP Officejet 5746	
HP ENVY 4500	HP Officejet 8040 with Neat	
HP ENVY 4501		
HP ENVY 4502		
HP ENVY 4504		
HP ENVY 4505		
HP ENVY 5530		
HP ENVY 5531		
HP ENVY 5532		
HP ENVY 5534		
HP ENVY 5535		
HP ENVY 5539		
HP Officejet 2620		
HP Officejet 2621		
HP Officejet 4630		

Compatible Printers (Continued)		
HP 564XL	HP 950/951XL	HP 970/971XL
HP Photosmart Premium Fax - C410a	HP Officejet 8600 Series	HP Officejet Pro X451dn
HP Deskjet 3070A - B611c	HP Officejet Pro 251dw	HP Officejet Pro X451dw
HP Deskjet 3520	HP Officejet Pro 276dw Multifunction	HP Officejet Pro X476dn Multifunction
HP Deskjet 3521	HP Officejet Pro 8100 - N811a/N811d	HP Officejet Pro X476dw Multifunction
HP Deskjet 3522	HP Officejet Pro 8600	HP Officejet Pro X551
HP Officejet 4620	HP Officejet Pro 8600 - N911a	HP Officejet Pro X576dw Mono MFP
HP Officejet 4622	HP Officejet Pro 8600 Plus	HP Officejet Pro X576dw Multifunction
HP Photosmart 5510 - B111a	HP Officejet Pro 8600 Plus - N911g	
HP Photosmart 5511 - B111j	HP Officejet Pro 8600 Premium	
HP Photosmart 5512 - B111a	HP Officejet Pro 8600 Premium - N911n	
HP Photosmart 5514 - B111h	HP Officejet Pro 8610	
HP Photosmart 5515 - B111a	HP Officejet Pro 8615	
HP Photosmart 5520	HP Officejet Pro 8620	
HP Photosmart 5522	HP Officejet Pro 8625	
HP Photosmart 5525	HP Officejet Pro 8630	
HP Photosmart 6510 - B211a		
HP Photosmart 6512 - B211a		
HP Photosmart 6515 - B211a		
HP Photosmart 6520		
HP Photosmart 6525		
HP Photosmart 7510 - C311a		
HP Photosmart 7515 - C311a		
HP Photosmart 7520		
HP Photosmart 7525		
HP Photosmart B8550 Photo		
HP Photosmart C6340		
HP Photosmart C6350		
HP Photosmart C6380		
HP Photosmart D5460		
HP Photosmart eStation - C510a		
HP Photosmart Plus - B209a		
HP Photosmart Plus - B210a		
HP Photosmart Plus - B210e		
HP Photosmart Premium - C309g		
HP Photosmart Premium - C310a		
HP Photosmart Premium Fax - C309a		
HP Photosmart Premium Fax - C410a		
HP Photosmart Premium TouchSmart Web - C309n		

APPENDIX 4: CONCLUSION

HP Ink Outperforms Third-Party Inks			
Page Count	Reliability	Wasted Pages	Printer Damage
<ul style="list-style-type: none"> • Non-HP inks tested printed fewer than 49% the pages – on average – than tested Original HP ink cartridges. • Original HP ink cartridges printed more than 2x the pages – on average – than non-HP inks tested. • Original HP ink cartridges printed more than 707 greater pages – on average – than non-HP inks tested. 	<ul style="list-style-type: none"> • 58% of tested non-HP inks either failed during use or right out of the box. • Original HP ink cartridges tested worked every time. 	<ul style="list-style-type: none"> • Non-HP inks tested produced over 29x more wasted pages – on average – than Original HP ink cartridges. • Original HP inks produced 97% fewer wasted pages – on average – than non-HP inks tested. 	<ul style="list-style-type: none"> • Non-HP inks tested caused irreversible damage to printers, costing time and money. • Non-HP inks tested destroyed printheads and caused irreparable printer damage. • 31% of tested printers were permanently damaged by use of non-HP inks. • 100% of tested printers using Original HP inks were undamaged – saving time and money vs. non-HP inks. • Original HP ink cartridges tested did not cause any printhead nor printer damage.