

BLI Comparative Performance Evaluation

JUNE 2015

Epson A4 Business Inkjet Devices versus Competing A4 Colour Laser Devices

Test Objective

Buyers Laboratory LLC (BLI) was commissioned by Seiko Epson Corporation (SEC) to conduct testing of three Epson inkjet devices (WorkForce Pro WF-R5690 DTWF/WF-5690 DWF/WF-5620 DWF) and five competing A4 laser devices. BLI tested the devices for productivity, environmental impact, image quality, reliability, waste generation and user intervention and compared the results for the Epson inkjet models with those for the laser devices. The laser models tested were the HP LaserJet Color Pro M451dn, HP LaserJet Pro M476dn, Brother MFC-9330CDW, Brother HL-3140CW and Samsung Xpress C1810W. All testing was conducted at BLI's European test facility in Wokingham, UK.

Tested Devices

Device	Connection	Printer PDL	Driver Version	Rated speed (PPM)
Epson WorkForce Pro WF-5690 DWF	Ethernet	GDI	2.42	20
Epson WorkForce Pro WF-R5690 DTWF¥	Ethernet	GDI	2.42	20
Epson WorkForce Pro WF-5620 DWF	Ethernet	Host based	2.42	20
HP LaserJet Pro 400 Color M451dn‡	Ethernet	PCL 6	5.3.0.12262	20
HP LaserJet Pro MFP M476dn	Ethernet	PCL 6	5.7.0.16769	20
Brother MFC-9330CDW	Ethernet	Host based	1.13.00	22
Brother HL-3140CW*‡	USB	Host based	1.11.00	18
Samsung Xpress C1810W*‡	Ethernet	PCL 6	3.12.38.00:05	18

*No duplex capability

‡Printer-based model, no copy functionality

¥The WF-R5690 DTWF was not tested for productivity and image quality

Executive Summary

With its latest A4 business inkjet printers, Epson aims to deliver the image quality, productivity and affordability of work-group laser devices, but with the traditional inkjet advantages of much lower power consumption, ease of maintenance and considerably less waste. Living up to these aims in BLI's rigorous lab evaluation, the Epson inkjet devices gave a very strong performance in virtually all areas of testing, delivering clear speed advantages in many areas, very good image quality (even in default mode and on plain paper), less waste generation and impressive energy efficiency.

In first-page-out (FPOT) and first-set-out (FSOT) speed tests, the Epson WF-5620 DWF and WF-5690 DWF demonstrated a superior speed advantage across most of the simplex and duplex workflows compared with their laser test group rivals, while they were competitive in the estimated saturated throughput (ESAT) tests. In particular, the WorkForce Pro WF-5620 DWF proved to be the most productive device overall in duplex mode in both the FSOT and FPOT tests. Similarly, in BLI's business document workflow test, designed to test a device's ability to handle a typical mix of business documents printed in a multi-user environment, the WF-5620 DWF was the most productive device from its active state, delivering a total FPOT 46.9% faster than the fastest laser device; while its total FSOT was competitive with the fastest laser device.

Using a selection of business test documents, BLI conducted productivity performance testing on each device after being in sleep mode for five minutes. As would be expected of inkjet devices, which characteristically do not require as much warm up time as laser devices, the two Epson models displayed much faster FPOT times across the board when compared with the competitive laser models tested.

When evaluating image quality produced in default mode on standard plain paper, there was very little to distinguish between the output produced by the inkjet and competing laser devices. All models delivered dark and crisp character definition, distinct fine lines and smooth circles; while colour and black halftone fills were smooth and consistent across the full range with distinct transitions between all levels.

Results for the photographic image testing conducted in default mode on standard plain paper were mixed: colours produced by the inkjets were slightly less vivid compared to laser output, which is not surprising, given that the Epson inkjet devices registered lower optical densities and smaller colour gamut sizes than those delivered by the laser models. That said, fine detail in light and dark contrast areas was far better maintained by the inkjet models. When printing on photo paper, the Epson inkjets proved to be more media-sensitive, delivering larger colour gamut sizes over those of their laser competitors. Another strength of the Epson inkjet devices is their impressively low mean Delta E drifts ranging from 0.6 to 0.8, versus a mean of 1.0 to 2.2 for laser models over a 250-page print run—plus they exhibited less colour variance—which supports the argument that inkjet devices deliver superior colour consistency over time.

In BLI's environmental evaluation—in which devices were tested in default mode and in simplex only (as two of the laser models lack duplex capability), following BLI's proprietary energy consumption test methods—the Epson WF-5620 DWF, WF-5690 DWF, plus WF-R5690 DTWF models all delivered an impressive demonstration of energy efficiency, offering by far the lowest projected weekday and annual energy consumption compared with the laser models in the test group. The Epson WF-5620 DWF, in particular, delivered a superior environmental performance with the lowest energy consumed while in its active state, and during five minutes of copying and printing; its noise emissions were also the lowest on average of all models tested.

From a waste creation perspective, the Epson RIPS device was the clear winner—it generated no waste in BLI's test—while its sister cartridge-based model, the WF-5690 DWF, delivered significantly lower levels of waste than its HP rival when both devices ran 40,000-impressions. In fact, the WF-5690 DWF produced an impressive 97.3% less consumable waste by weight. In addition, the Epson device used fewer cartridges than its HP rival which also results in fewer stoppages and less downtime. In terms of overall reliability, the Epson and HP cartridge-based models experienced no misfeeds at all, while the Epson WF-R5690 DTWF experienced three misfeeds during the 40,000-impression test. It also exhibited two image quality issues which were resolved by conducting print head cleaning cycles.

While the laser models offered some advantages in terms of image quality, with vibrant colours, higher solid densities and larger colour gamuts on standard plain media, their performance in the productivity and energy consumption evaluation was eclipsed by the inkjet devices. Based on the lab evaluation results, BLI feels the Epson inkjets delivered the best performance overall, with vastly better energy efficiency, superior productivity and far less waste generation. The Epson inkjets are certainly capable of providing cost-conscious, productive and environmentally friendly printing, to complement their low upfront cost investment, making these devices strong choices for small to mid-size workgroups.

Productivity

In BLI's first-set-out and first-page-out testing, using the multi-page PDF, Word and Excel test files as stipulated in the ISO 24734:2009 methodology, the Epson devices displayed a superior speed advantage across all simplex and duplex workflows overall, with the sole exception of the Excel test file in duplex for the FSOT test (the HP LaserJet Pro MFP M476dn completed the test faster).

In the FSOT test in simplex mode, the Epson WorkForce Pro WF-5690 DWF was the most productive device, with an average time (16.91 seconds) that was 37.7% faster when compared with the next fastest (27.14 seconds) laser device, the Brother HL-3140CW. The Epson WorkForce Pro WF-5620 DWF proved to be the most productive device overall in duplex mode in both the FSOT and FPOT tests. In the FPOT test in duplex, the Epson WF-5620 DWF'S average time (14.98 seconds) was 47.0% faster than that of the fastest laser device HP LaserJet Pro MFP M476dn (28.28 seconds).

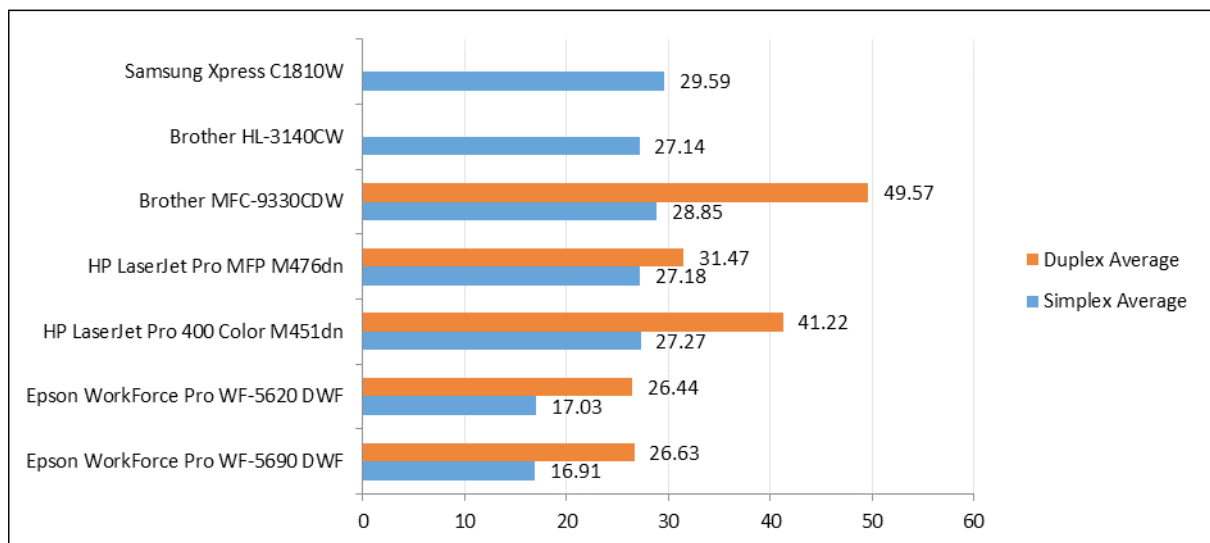
In the estimated saturated throughput (ESAT) speed tests (a measure of speed that eliminates the impact of the first set), the Epson devices were competitive in both simplex and duplex workflows.

First-Set-Out Test Results (seconds)

	FSOT Simplex				FSOT Duplex			
	PDF	Word	Excel	Average	PDF	Word	Excel	Average
Epson WorkForce Pro WF-5690 DWF	16.05	14.23	20.47	16.91	26.54	23.35	30.02	26.63
Epson WorkForce Pro WF-5620 DWF	16.65	13.83	20.60	17.03	26.34	23.12	29.86	26.44
HP LaserJet Pro 400 Color M451dn	27.24	25.92	28.64	27.27	41.51	39.33	42.83	41.22
HP LaserJet Pro MFP M476dn	27.04	26.14	28.35	27.18	39.93	26.14	28.35	31.47
Brother MFC-9330CDW	27.72	27.65	31.17	28.85	48.82	48.06	51.83	49.57
Brother HL-3140CW	26.43	25.97	29.03	27.14	No duplex capability			
Samsung Xpress C1810W	28.97	28.35	31.45	29.59				

First-Set-Out Time (FSOT) is defined as the length of time (in seconds) the device takes to produce pages, measured from the initiation of the print job to the complete exit of the last page of the first test set. See www.iso.org and reference ISO standard 24734 for additional details.

Average First-Set-Out Test Results (seconds)

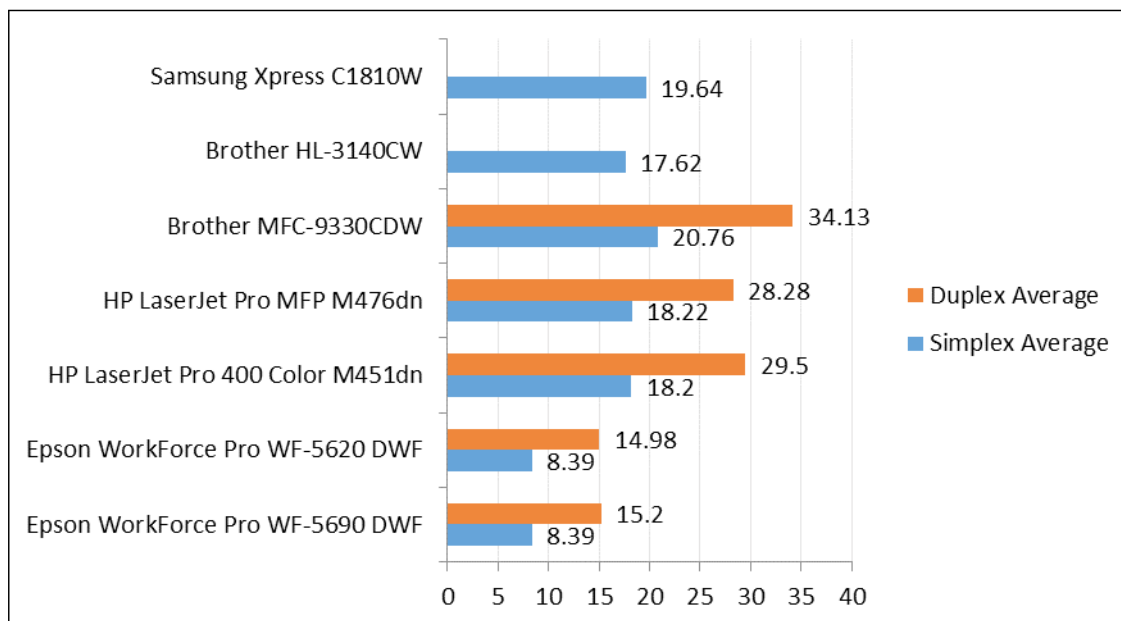


First-Page-Out Test Results (seconds)

	FSOT Simplex				FSOT Duplex			
	PDF	Word	Excel	Average	PDF	Word	Excel	Average
Epson WorkForce Pro WF-5690 DWF	7.68	6.89	10.60	8.39	14.59	13.30	17.71	15.20
Epson WorkForce Pro WF-5620 DWF	7.77	6.51	10.89	8.39	14.46	12.98	17.50	14.98
HP LaserJet Pro 400 Color M451dn	17.93	16.92	19.74	18.20	29.78	27.51	31.22	29.50
HP LaserJet Pro MFP M476dn	18.04	17.16	19.46	18.22	28.14	26.78	29.93	28.28
Brother MFC-9330CDW	19.14	19.88	23.27	20.76	32.48	33.05	36.86	34.13
Brother HL-3140CW	16.82	16.46	19.59	17.62	No duplex capability			
Samsung Xpress C1810W	19.08	18.37	21.49	19.64				

First-Page-Out Time (FPOT) is defined as the length of time (in seconds) the device takes to produce a page measured from job release to the complete exit of the first page of the first test file.

Average First-Page-Out Test Results (seconds)

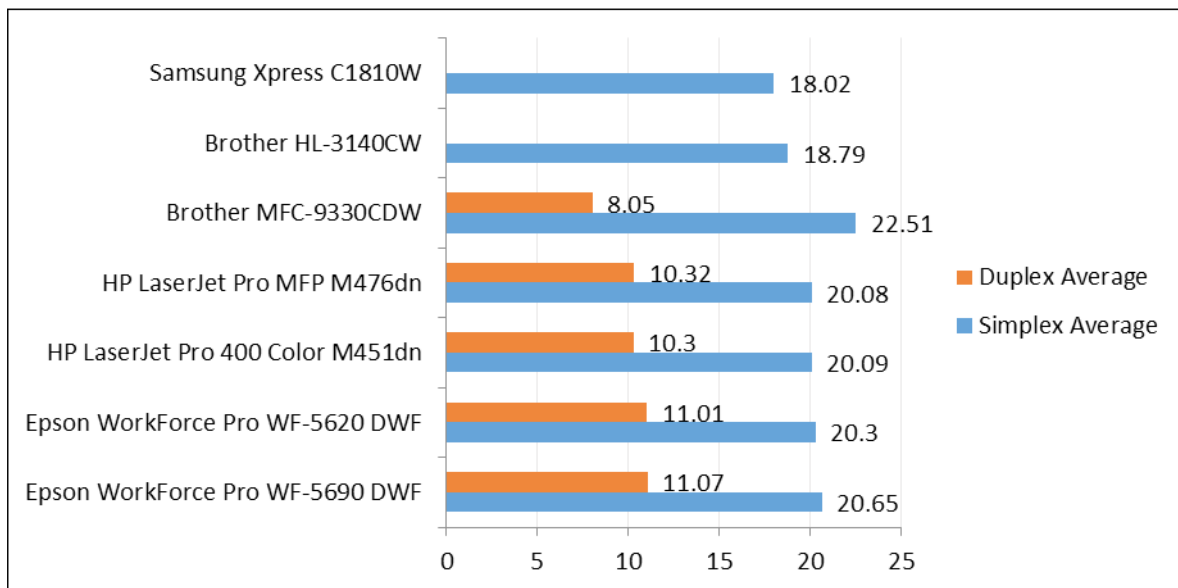


Estimated Saturated Throughput Test Results (images per minute)

	Simplex				Duplex			
	PDF	Word	Excel	Average	PDF	Word	Excel	Average
Epson WorkForce Pro WF-5690 DWF	20.22	23.86	17.86	20.65	10.57	12.32	10.33	11.07
Epson WorkForce Pro WF-5620 DWF	19.21	23.86	17.83	20.30	10.45	12.17	10.41	11.01
HP LaserJet Pro 400 Color M451dn	20.06	20.11	20.10	20.09	10.31	10.31	10.28	10.30
HP LaserJet Pro MFP M476dn	20.17	20.02	20.06	20.08	10.35	10.30	10.33	10.32
Brother MFC-9330CDW	22.57	22.29	22.66	22.51	8.21	7.95	7.97	8.05
Brother HL-3140CW	18.80	18.85	18.74	18.79	No duplex capability			
Samsung Xpress C1810W	18.03	18.00	18.03	18.02				

Estimated Saturated Throughput (ESAT) is defined as the rate at which a device produces pages, measured from the complete exit of the last page of the first test set through to the complete exit of the last page of the last test set. ESAT is expressed in images per minute (ipm). See www.iso.org and reference ISO standard 24734 for additional details.

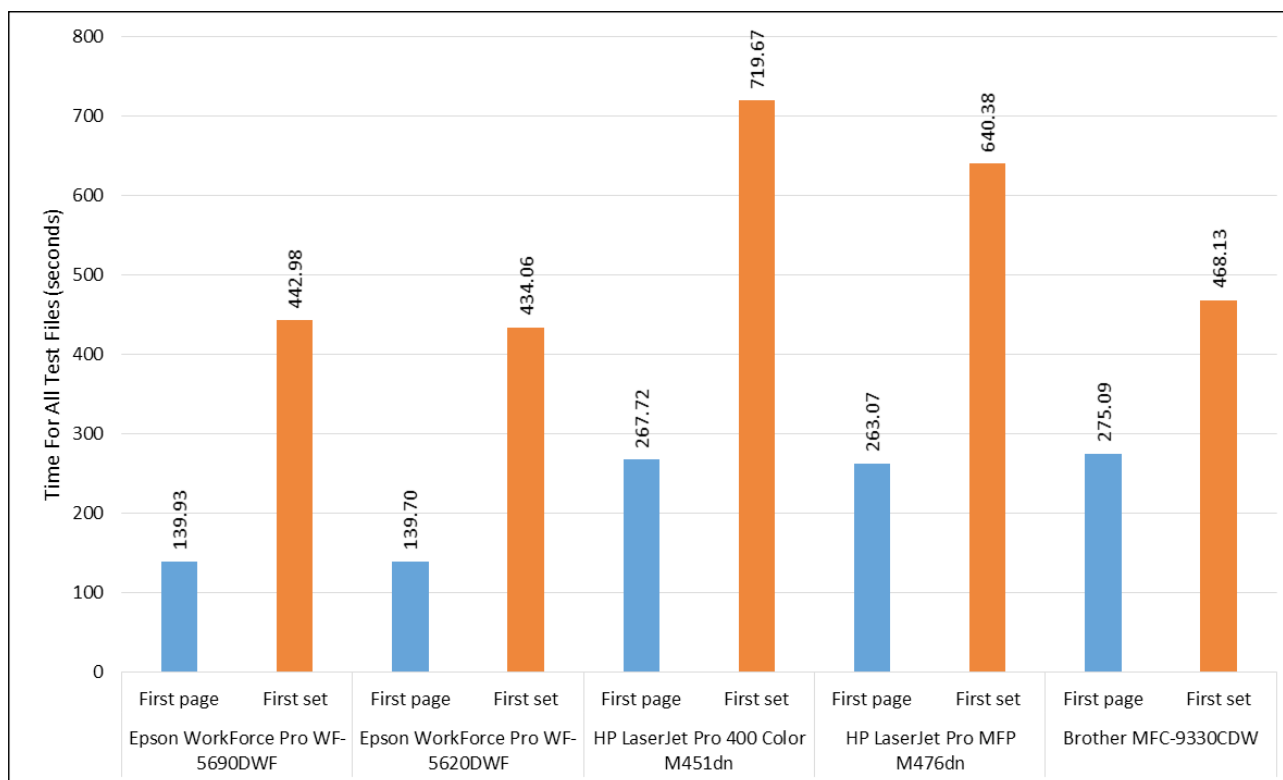
Estimated Saturated Throughput Test Results (images per minute)



Business Document Workflow FPOT and FSOT Test Results From Idle Mode

In BLI's business document workflow test, 12 separate file types of varying lengths (a mix of MS Office, TIFF, HTML and PDF documents, in black and colour, totalling 83 pages)—designed to reflect a typical mix of business documents printed in a multi-user environment—were sent to print when the devices were in idle mode, with the time from job release to final page out recorded. The chart below documents the total time for all test files by first-page-out and first-set-out.

Total FPOT and FSOT Results (From Idle Mode, in seconds)



Note: The Brother HL-3140CW and the Samsung Xpress C1810W did not print all of the business test documents therefore their respective FSOT times cannot be included in any like-for-like FSOT comparative analysis.

The two Epson devices outclassed their A4 laser competitors, proving to be the more productive devices overall, particularly in the FPOT test with all document times aggregated. The Epson WorkForce Pro WF-5620 DWF was the fastest device with an FPOT time of 139.70 seconds—123.37 seconds, or 46.9% faster than the 263.07 seconds for the fastest laser device (HP LaserJet Pro MFP M476dn). When evaluating the overall FSOT times for the entire business document test suite, the Epson WF-5620 DWF and WF-5690 DWF were the first and second fastest devices, versus all A4 laser competitors capable of completing the entire workflow.

When evaluating productivity performance per individual test file, the two Epson devices produced largely comparable FPOT and FSOT speeds; both delivered considerably faster than average FPOT times across all test files. The WF-5620 DWF had a slight edge over its sister model with the faster FSOT speeds for eight of the 12 business document test files; compared with the competitive group average, both Epson models had faster FSOT times than their laser rivals for six out of the 12 test files, and were competitive for the other six files.

FPOT Times per Test File (From Idle Mode, in seconds)

Document name	Idle mode		Epson WorkForce Pro WF-5690 DWF	Epson WorkForce Pro WF-5620 DWF	HP LaserJet Pro 400 Color M451dn	HP LaserJet Pro MFP M476dn	Brother MFC-9330CDW	Brother HL-3140CW	Samsung Xpress C1810W	Average speed across all devices
	No pages	file type	First page	First page	First page	First page	First page	First page	First page	First page
ISO 24734 (PDF file)	4	.pdf	7.68	7.77	17.93	18.04	19.14	16.82	19.08	15.21
BLI Test document	1	.docx	7.90	7.81	17.20	15.87	19.12	15.94	17.81	14.52
www.CNN.com (home page)	2	.html	8.81	8.73	18.05	18.50	21.31	17.70	20.36	16.21
Government tax form	6	.pdf	8.50	8.22	16.72	16.67	21.81	17.16	18.44	15.36
Press release	3	.docx	7.03	8.00	16.72	16.40	18.84	16.30	18.12	14.49
Powerpoint presentation	22	.pptx	12.44	12.30	27.06	21.64	23.06	18.08	23.94	19.79
Excel spreadsheet	5	.xlsx	8.25	8.06	17.75	17.59	20.89	15.84	19.37	15.39
Hi-Res product brochure	12	.pdf	9.02	9.25	21.31	20.70	23.15	20.11	23.31	18.12
Letter with Hi-Res image	2	.docx	11.27	10.00	18.09	18.16	20.15	17.03	20.91	16.52
Government tax form (300dpi scan)	6	.tiff	15.56	15.19	24.84	22.80	21.50	17.42	24.75	20.29
Booklet*	16	.pdf	34.59	31.06	45.33	53.08	45.28			41.87
Multipage 4 into 1 (16 page document)**	4	.pdf	8.88	13.31	26.72	23.62	20.84	15.74		18.19
Total time for all test files.			139.93	139.70	267.72	263.07	275.09	188.14	206.09	

*The Brother HL-3140CW and Samsung Xpress C1810W did not output this test file.

**The Samsung Xpress C1810W did not output this test file.

FSOT Times per Test File (From Idle Mode, in seconds)

Document name	Idle mode		Epson WorkForce Pro WF-5690 DWF	Epson WorkForce Pro WF-5620 DWF	HP LaserJet Pro 400 Color M451dn	HP LaserJet Pro MFP M476dn	Brother MFC-9330CDW	Brother HL-3140CW	Samsung Xpress C1810W	Average speed across all devices
	No pages	file type	First set	First set	First set	First set	First set	First set	First set	First set
ISO 24734 (PDF file)	4	.pdf	16.05	16.65	27.24	27.04	27.72	26.43	28.97	21.26
BLI Test document	1	.docx	7.90	7.81	17.20	15.87	19.12	15.94	17.81	12.71
www.CNN.com (home page)	2	.html	13.19	13.37	21.08	21.62	23.89	21.10	23.61	17.23
Government tax form	6	.pdf	30.47	30.09	31.94	31.42	34.81	33.31	34.94	28.37
Press release	3	.docx	13.81	14.75	22.69	22.58	24.10	22.76	24.47	18.15
PowerPoint presentation	22	.pptx	93.16	92.79	172.44	125.57	78.27	84.68	93.69	92.58
Excel spreadsheet	5	.xlsx	21.31	21.14	29.75	29.69	31.47	28.56	32.62	24.32
Hi-Res product brochure	12	.pdf	61.48	56.97	95.85	82.77	52.04	54.53	59.59	57.90
Letter with Hi-Res image	2	.docx	14.95	13.68	42.12	21.19	22.75	20.25	23.94	19.86
Government tax form (300dpi scan)	6	.tiff	46.71	42.22	81.34	58.48	34.68	33.49	52.96	43.74
Booklet*	16	.pdf	100.22	96.78	100.90	150.66	90.34			107.78
Multipage 4 into 1 (16 page document)**	4	.pdf	23.73	27.81	77.12	53.49	28.94	25.24		39.39
Total time for all test files.			442.98	434.06	719.67	640.38	468.13	366.29	392.60	

*The Brother HL-3140CW and Samsung Xpress C1810W did not output this test file.

**The Samsung Xpress C1810W did not output this test file.

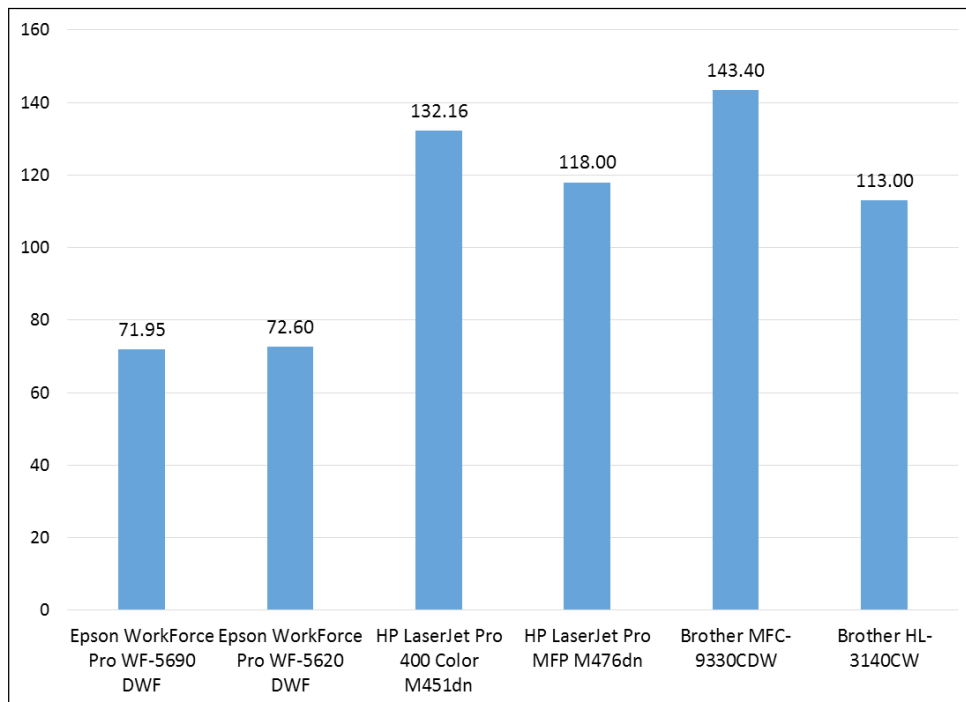
Business Document Workflow FPOT and FSOT Test Results From Sleep Mode

Using a selection of business test documents (six files, totalling 41 pages), BLI conducted productivity performance testing on each device after being in Sleep mode for five minutes. There was another strong showing from the two Epson inkjet devices. As expected of inkjet models which characteristically do not require as much warm up time as laser devices, the Epson models displayed much faster FPOT times across the board when compared with the competitive laser group average. The Epson inkjets registered FSOT times that were competitive for all but two of the test files—the press release and the multipage 4 on 1—which were above average.

FPOT Times per Test File (From Five Minutes Sleep, in seconds)

	5 Minute sleep		Epson WorkForce Pro WF-5690 DWF	Epson WorkForce Pro WF-5620 DWF	HP LaserJet Pro 400 Color M451dn	HP LaserJet Pro MFP M476dn	Brother MFC-9330CDW	Brother HL-3140CW	Samsung Xpress C1810W	Average speed across all devices
Document name	No pages	file type	First page	First page	First page	First page	First page	First page	First page	First page
ISO 24734 (PDF file)	4	.pdf	11.00	10.99	18.31	18.8	24.95	18.75	21.06	17.69
Government tax form	6	.pdf	11.56	11.64	18.46	16.77	22.34	19.91	21.55	17.46
Press release	3	.docx	10.09	10.31	18.03	17.75	23.15	19.20	19.91	16.92
Powerpoint presentation	22	.pptx	15.63	15.88	26.84	21.64	24.13	18.47	24.02	20.94
Letter with Hi-Res image	2	.docx	11.81	11.90	20.61	19.16	23.38	18.75	20.97	18.08
Multipage 4 into 1 (16 page document)	4	.pdf	11.86	11.88	29.91	23.88	25.45	17.92		20.15
Total time for all test files.			71.95	72.60	132.16	118.00	143.40	113.00	107.51	

FPOT Combined Time for Entire Test Suite (From Sleep Mode, in seconds)



Note: The Samsung Xpress C1810W did not print all of the business test documents therefore its respective FPOT times cannot be included in any like-for-like FPOT comparative analysis.

FSOT Times per Test File (From Five Minutes Sleep, in seconds)

5 Minute sleep			Epson WorkForce Pro WF-5690 DWF	Epson WorkForce Pro WF-5620 DWF	HP LaserJet Pro 400 Color M451dn	HP LaserJet Pro MFP M476dn	Brother MFC-9330CDW	Brother HL-3140CW	Samsung Xpress C1810W	Average speed across all devices
Document name	No pages	file type	First set	First set	First set	First set	First set	First set	First set	First set
ISO 24734 (PDF file)	4	.pdf	20.50	20.74	27.98	27.73	32.91	28.28	30.59	23.59
Government tax form	6	.pdf	33.43	33.53	33.24	31.84	35.31	35.56	40.26	30.40
Press release	3	.docx	17.06	17.13	23.77	23.72	28.19	25.56	27.84	20.41
Powerpoint presentation	22	.pptx	98.62	98.38	180.63	165.06	79.35	85.61	95.91	100.45
Letter with Hi-Res image	2	.docx	15.50	15.55	23.61	21.94	26.05	21.75	24.94	18.67
Multipage 4 into 1 (16 page document)	4	.pdf	26.78	26.63	80.34	53.60	33.45	27.56		35.48
Total time for all test files.			211.89	211.96	369.57	323.89	235.26	224.32	219.54	

FSOT Combined Time for Entire Test Suite (From Sleep Mode, in seconds)

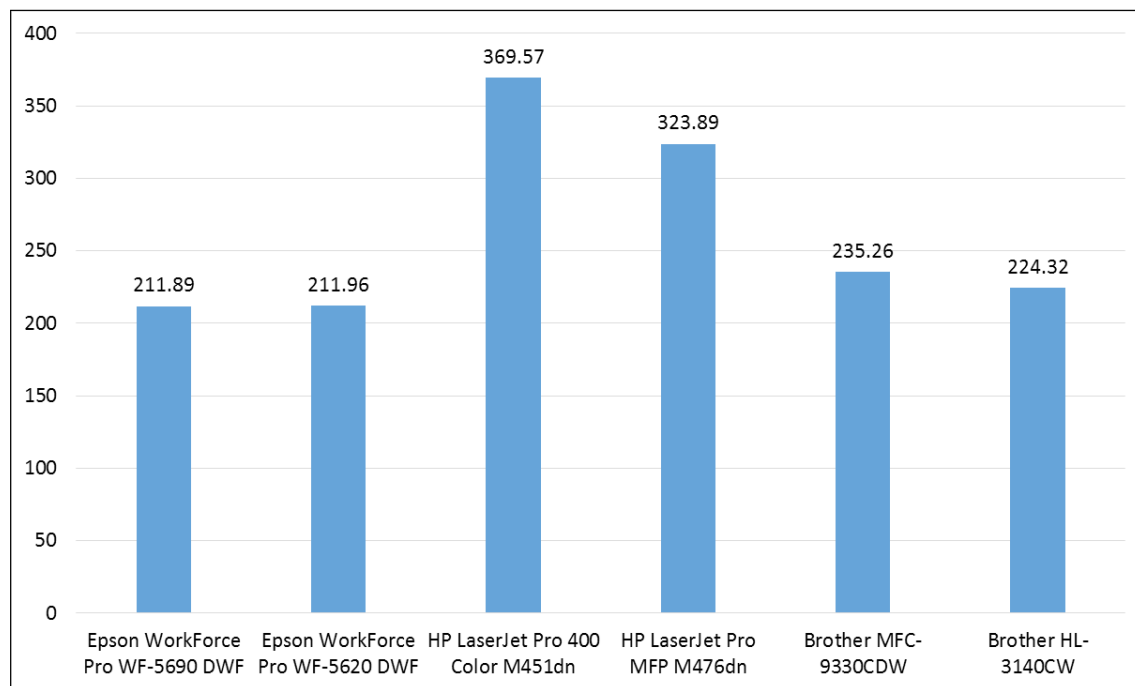
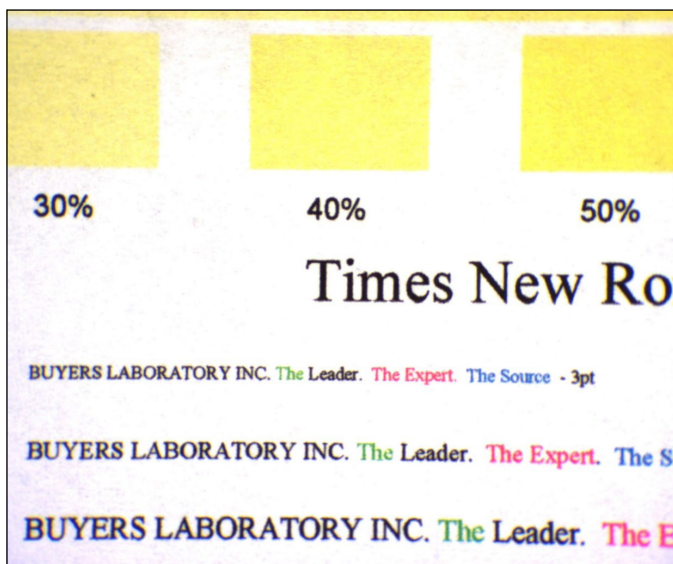
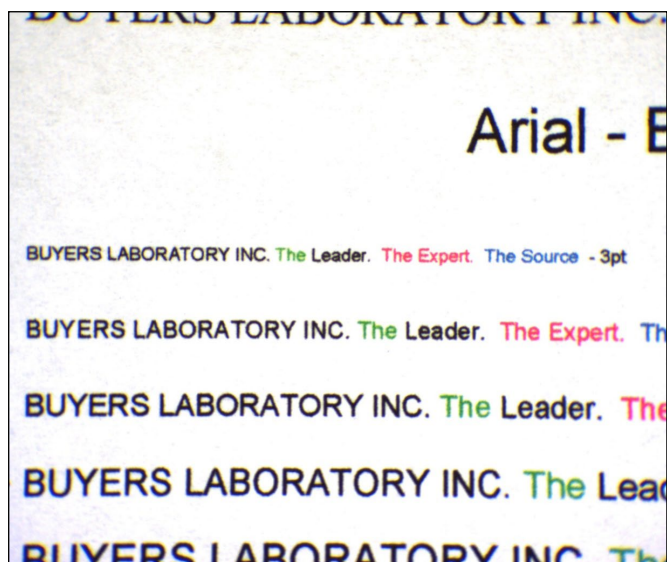


Image Quality

Test Description: Using a range of BLI and industry-standard test targets, image quality was assessed from a variety of perspectives including optical density, photographic image reproduction, consistency of duplex output and colour consistency. All tests were conducted in default quality mode (for laser devices) and draft, default and best modes (for Epson inkjet devices) using 80gsm multipurpose office paper. Colour gamut evaluation was performed using the same 80gsm plain office paper and photo paper (190gsm glossy photo paper for inkjet models and 200gsm photo colour paper for laser devices).

Text and Fine Line Reproduction

In BLI's text reproduction evaluation, there was very little to distinguish between output produced by the inkjet devices and the competing laser models. All delivered excellent and comparable text quality in default mode in simplex; serif and sans serif fonts on plain 80gsm media were legible down to the smallest 3-pt. font size, with no breakup across the board. As expected, the inkjet devices' fonts were slightly poorer in draft mode, and were only legible down to the 5- and 6-pt. levels, whilst in best mode, character definition was much improved with all fonts legible down to 3-pt. level.



Epson WorkForce Pro WF-5690 DWF's sans serif (Arial) and serif (Times Roman) fonts are clear and legible down to the smallest size.

Fine lines produced by all the laser models and both Epson inkjet devices remained distinct at the 0.1-pt. level in default mode, and (for the inkjets) in best mode as well. In draft mode, fine lines delivered by the Epson models were rated fair and were only distinct at the 0.25-pt. level. Circles were smooth and rated good with the laser devices and remained distinct to the 0.1-pt level—this same level of quality was attained by the Epson inkjet devices in default simplex mode and also in best mode. In default mode, all devices produced the 1 x 1 pixel grid with no quality issues; as expected in draft mode where less ink is laid down, the Epson models delivered 2 x 2 pixel grids that were rated as poor. The laser models were capable of producing white-on-black fine lines down to the 0.1-pt level and were rated good to very good. The majority of the inkjet devices' white-on-black fine lines were visible down to the 0.25-pt. level and were rated good across all quality settings.

The colour and black halftone fills produced by the inkjet and laser models in default mode were smooth and consistent across the 10% to 100% dot-fill levels, with distinct transitions between all levels, and displayed no mottling. In draft mode, the Epson devices' greyscale coverage was only rated fair and lacked definition at the lighter end of the range. However, colour halftone coverage was still rated good and with distinct transitions across the full range. In best mode, colour and black halftone quality was, as expected, enhanced and was rated very good as per the quality delivered by the inkjets and laser models in default mode.

Subjective Image Quality Analysis

BLI analysts noted that on 80gsm plain paper in default settings, there were subtle differences between the images produced by the inkjets compared with images from the laser devices, but overall, quality was rated as very good across the board, bar the two Brother laser models which were rated as good.

As would be expected given their lower optical densities and smaller colour gamuts on plain paper, photographic images produced by the Epson inkjets lacked the vibrancy and saturated colours shown in the output from laser devices, with the HP LaserJet Pro 400 Color M451dn, in particular, producing exceptionally bright vivid colours. However, the Epson inkjets in default mode did deliver better detailing in dark and light contrast areas over most of their laser rivals. By comparison, output from the two Brother models and the aforementioned HP M451dn device exhibited poorer definition in dark contrast areas.

The overall best performer was the Samsung C1810W which produced bright, saturated colours and the same level of fine detailing in dark and light contrast areas as delivered by the Epson inkjets. When tested in draft mode, images produced by the Epson inkjet devices were deemed inferior, with pale, 'washed-out' colours and poor definition. The image quality delivered by the Epson inkjets tested in best mode was on a par with that produced by them in default mode, and was rated very good across the board.



Though Epson's colours were not as vibrant as those in output produced by laser models, photographic output showed very good transitions from light to dark areas. Finer details were not lost in dark backgrounds (see image of the car above; note how the folds in the fabric under the car are clearly visible).



The Samsung C1810W produced the best photographic image quality overall, with vibrant colours and excellent detailing in light and dark areas.



Epson's output produced in Draft mode (top) was washed out, as would be expected, but showed some finer details. In Default (standard) mode (bottom), colours were noticeably brighter.

Solid Density

In BLI's evaluation, the laser devices delivered considerably higher average black and colour optical densities in default mode overall when printing on 80gsm plain paper compared with those from the two Epson inkjet devices. Peak optical densities were largely in favour of the HP LaserJet Pro 400 Color M451dn, with higher peak optical densities for magenta and black (in both simplex and duplex), and cyan (in duplex). The highest peak yellow densities in simplex and duplex were delivered by the Samsung Xpress C1810W. Of the two Epson devices, the WF-5620 DWF scored the lowest average densities in the duplex workflow test, while the WF-5690 DWF registered the lowest average densities for CY and K in simplex.

Average Density in Simplex and Duplex (Default mode)

Device	Simplex				Duplex			
	Cyan Average	Magenta Average	Yellow Average	Black Average	Cyan Average	Magenta Average	Yellow Average	Black Average
Epson WorkForce Pro WF-5690 DWF	0.68	0.83	0.43	1.10	0.70	0.84	0.45	1.12
Epson WorkForce Pro WF-5620 DWF	0.70	0.82	0.46	1.11	0.69	0.82	0.44	1.08
HP LaserJet Pro 400 Color M451dn	1.45	1.35	0.87	1.44	1.43	1.35	0.84	1.50
HP LaserJet Pro MFP M476dn	1.47	1.25	0.83	1.43	1.45	1.30	0.84	1.47
Brother MFC-9330CDW	1.10	1.05	0.69	1.38	1.05	1.05	0.71	1.40
Brother HL-3140CW	1.15	1.06	0.75	1.26	1.15	1.04	0.73	1.28
Samsung Xpress C1810W	1.01	1.07	0.90	1.39	1.01	1.08	0.91	1.44

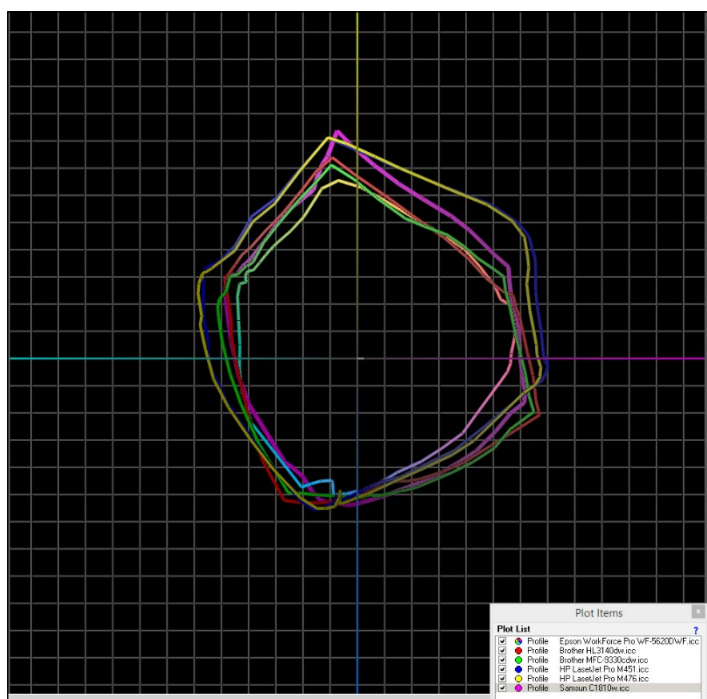
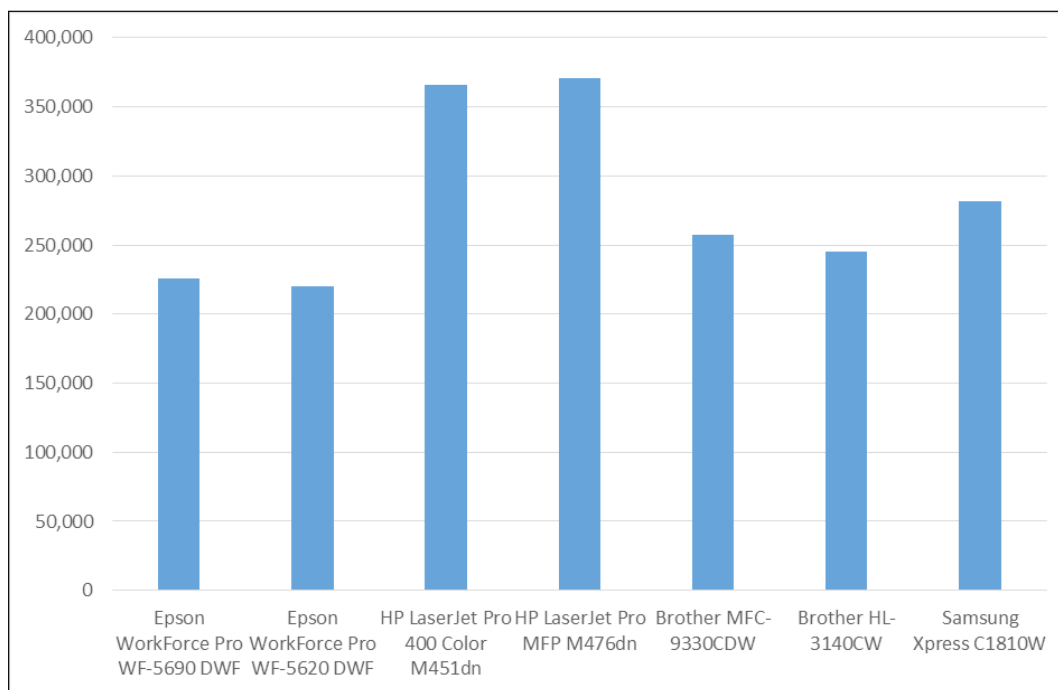
Colour Gamut

	80 gsm plain paper	100gsm glossy photo paper
Epson WorkForce Pro WF-5690 DWF	225,666	471,675
Epson WorkForce Pro WF-5620 DWF	220,248	454,733
HP LaserJet Pro 400 Color M451dn	365,449	437,395
HP LaserJet Pro MFP M476dn	370,442	446,807
Brother MFC-9330CDW	256,949	353,791
Brother HL-3140CW	245,355	328,865
Samsung Xpress C1810W	281,190	396,123

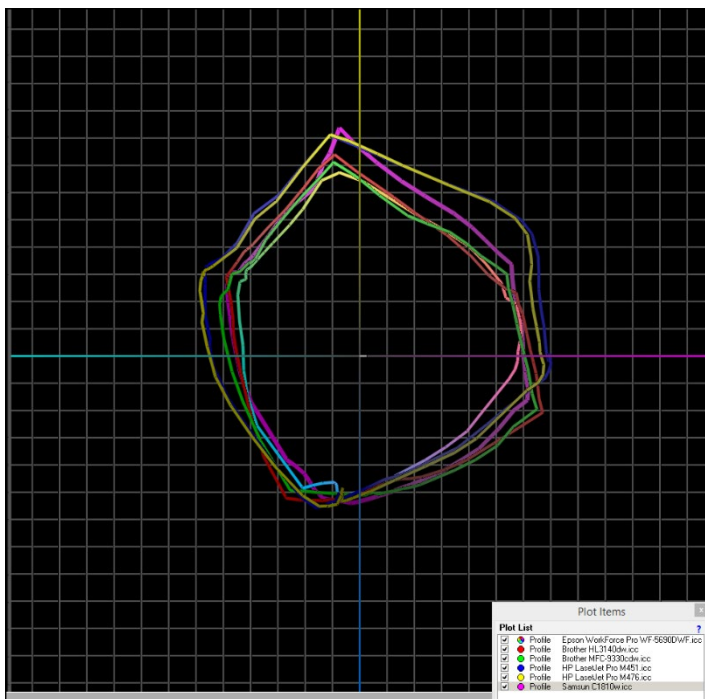
Using a 300-patch profile, an EFI ES1000 colour spectrophotometer and Chromix ColorThink Pro v2.0 software, BLI assessed the CIE colour gamut volume at the start and end of the test. The tests were conducted on 80gsm multi-purpose uncoated office paper and compatible 190 and 200 gsm glossy photo paper. When printing on standard office paper, the Epson models' colour gamuts are the smallest versus the laser devices—as expected, given the lack of vibrancy shown in their photographic image evaluation on this media.

In contrast, the WF-5690 DWF and WF-5620 DWF delivered the largest and second largest colour gamut, respectively, when printing on photo paper. The WF-5690 DWF's colour gamut was 5.6% larger than its nearest laser rival (HP LaserJet Pro MFP M476dn) and 43.4% larger versus the smallest colour gamut produced by a laser device in the competitive group (Brother HL-3140CW) on glossy photo media.

Colour Gamut Results (on Plain Paper)

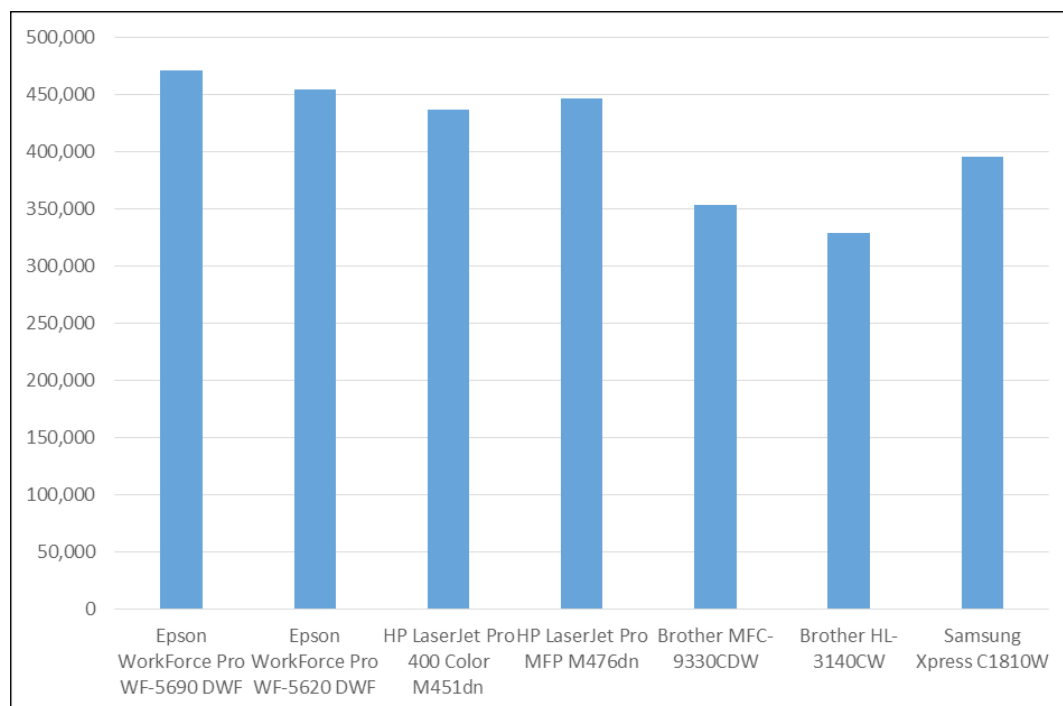


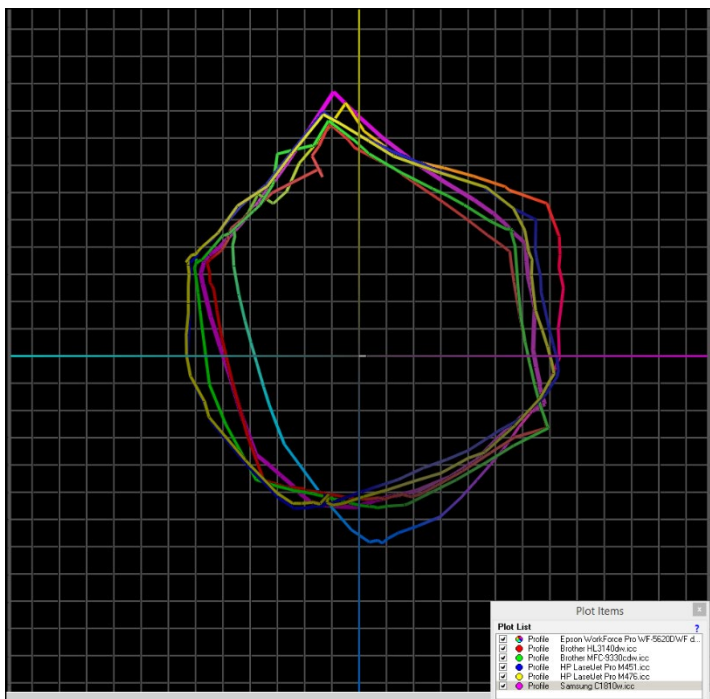
Epson WorkForce Pro WF-5620 DWF's colour gamut on 80gsm plain paper (polychromatic), was 10.2% smaller than the Brother HL-3140CW's colour gamut (red)—the next smallest colour gamut delivered by a laser device.



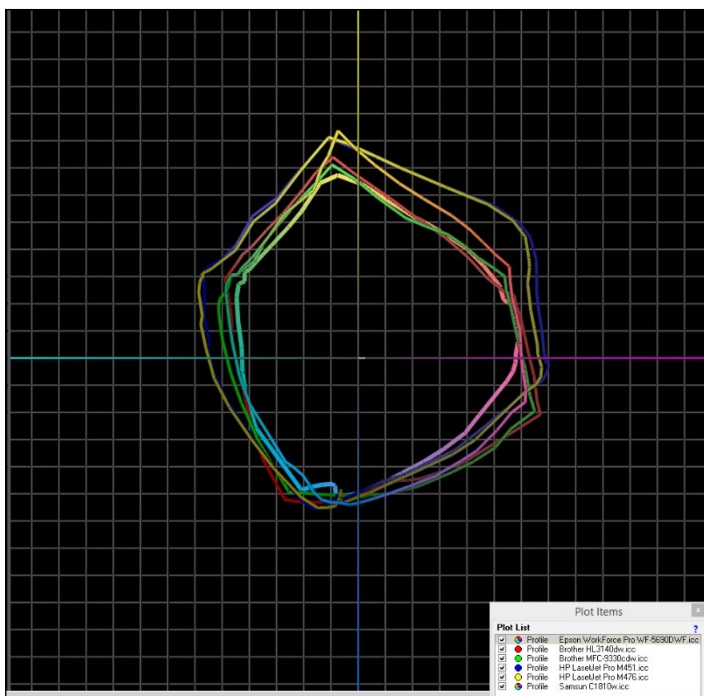
Epson WorkForce Pro WF-5690 DWF's colour gamut on 80gsm plain paper (polychromatic), was the second smallest colour gamut delivered in the test.

Colour Gamut Results (on Photo Paper)





Epson WorkForce Pro WF-5620 DWF was much more media sensitive, producing the second largest colour gamut on 100gsm photo paper (polychromatic).



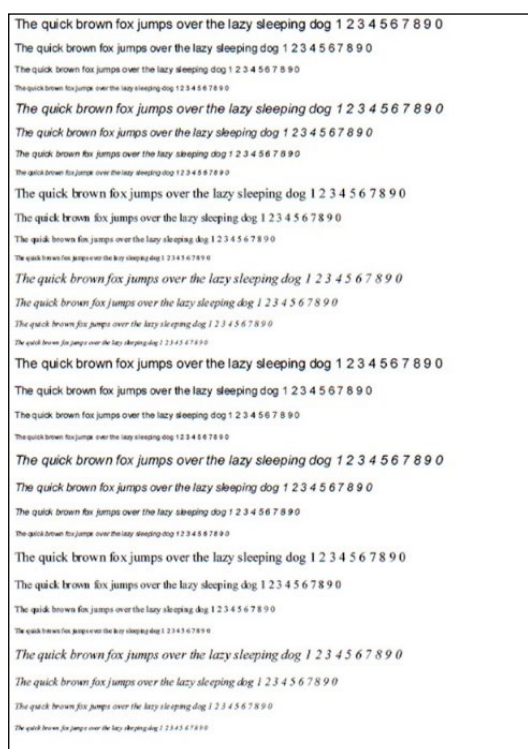
The Epson WorkForce Pro WF-5690 DWF's colour gamut (polychromatic) on 100gsm photo paper was the largest in volume, with increases in the yellow, red and magenta regions of the spectrum.

Consistency of Duplex Output

BLI analysts observed there was broadly the same level of consistency and quality in text and fine lines when produced in duplex workflows across all tested laser and inkjet devices. All models, again, delivered sans serif characters that were legible down to the smallest 3-pt. level, as were serif characters produced by the laser devices. The two Epson devices produced serif fonts legible down to the 4-pt. level, but in Best mode character definition improved to be fully legible at the 3-pt. level. In addition, fine lines remained distinct down to the 0.1-pt. level in the default duplex mode. There were some slight differences between simplex and duplex output with the Epson inkjet models; both devices produced circles that were smooth down to the 0.25-pt. level (as opposed to 0.1-pt. level) and were only capable of producing the 2 x 2 pixel grid (not the 1 x 1 grid) with no quality issues.

There was negligible difference between inkjet and laser models' duplex vs. simplex density readings, with the two inkjets, again, yielding a lower density average in duplex compared with the laser models. There was a slight increase in black duplex solid densities for all tested models except for the Epson WF-5620 DWF.

BLI's duplex test target



In order to assess the effect of potential showthrough caused by printing in duplex, BLI printed its proprietary test target (above) on both sides of 80gsm plain paper on the tested devices.

The output from the laser devices was very good; there was minimal showthrough on the standard office media. The inkjet devices could not match the laser devices, and exhibited enough showthrough on their duplex output to be judged fairly poor in comparison with the laser output and considered not suitable for external or more formal communication purposes. However, the inkjet output was deemed perfectly acceptable for general office use.

Colour Consistency across the page

Using a two-page BLI test target with multiple FOGRA39 media wedges running from top to bottom of the page and parallel to the long and short edges, BLI measured colour consistency across 46 target colours against a centre strip on each page, using an EFI ES1000 spectrophotometer and EFI Color Verifier software.

Colour Consistency (Portrait) versus Patch 3 (centre of page) Delta E Results

Device	Patch 1 (top of page)		Patch 2		Patch 4		Patch 5 (bottom of page)	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
Epson WorkForce Pro WF-5690 DWF	1.7	8.4	1.1	6.5	1.3	4.4	1.1	5.8
Epson WorkForce Pro WF-5620 DWF	0.7	1.5	0.8	2.5	0.8	2.0	0.6	1.3
HP LaserJet Pro 400 Color M451dn	1.6	2.8	0.9	1.7	1.2	3.3	1.7	4.3
HP LaserJet Pro MFP M476dn	1.3	3.0	1.2	3.0	1.3	2.9	1.5	3.2
Brother MFC-9330CDW	1.6	4.7	1.2	2.7	1.1	2.6	1.2	4.3
Brother HL-3140CW	1.6	3.8	1.3	3.3	1.3	3.8	1.4	3.9
Samsung Xpress C1810W	1.7	3.7	1.2	4.3	1.2	2.9	1.6	4.1

Colour Consistency (Landscape) versus Patch 3 (centre of page) Delta E Results

Device	Patch 1 (top of page)		Patch 2		Patch 4		Patch 5 (bottom of page)	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
Epson WorkForce Pro WF-5690 DWF	1.1	4.9	1.2	4.5	0.8	3.4	1.1	2.9
Epson WorkForce Pro WF-5620 DWF	0.8	2.1	0.9	1.9	1.0	3.4	1.0	2.1
HP LaserJet Pro 400 Color M451dn	2.3	5.2	1.6	4.0	1.6	4.1	2.4	4.8
HP LaserJet Pro MFP M476dn	1.9	4.6	1.3	3.7	1.9	4.0	3.1	6.6
Brother MFC-9330CDW	3.1	7.2	2.1	4.7	2.1	4.8	2.0	4.2
Brother HL-3140CW	2.0	4.6	1.5	4.1	1.7	4.1	2.3	4.7
Samsung Xpress C1810W	2.2	4.5	1.4	4.2	2.4	4.1	2.0	6.0

In the portrait test, BLI noted the Epson WF-5690 registered the highest peak densities, which ranged from 5.8 to 8.4. Conversely, the Epson WF-5620 produced far less variance and in fact had the lowest peak and average densities overall.

There were no significant results when printing the landscape test target, although the Epson WF-5620, again, was the most consistent performer with lower peak and average density readings throughout. There was little to distinguish between the results of the other tested models. While the Brother MFC-9330CDW displayed more colour variance with the highest peak densities for three of the four readings, the rest of the models (except the Epson WF-5620) registered averages that ranged from 0.8 to 3.1. Given that any variation in colour consistency below a Delta E measurement of 4.0 would be imperceptible to the unaided eye, BLI observed there was no significant difference in colour consistency performance between most of the tested models.

Colour Delta E Drift Summary over a 250-page print run

Device	Delta E - Colour drift									
	50		100		150		200		250	
	Mean	Peak	Mean	Peak	Mean	Peak	Mean	Peak	Mean	Peak
Epson WorkForce Pro WF-5690 DWF	0.6	1.5	0.7	1.6	0.7	1.7	0.8	1.4	0.6	1.8
Epson WorkForce Pro WF-5620 DWF	0.7	1.5	0.7	1.7	0.6	1.5	0.7	2.5	0.7	2.2
HP LaserJet Pro 400 Color M451dn	1.0	2.2	1.2	2.5	1.3	3.5	1.3	3.1	1.6	3.3
HP LaserJet Pro MFP M476dn	1.1	2.8	1.1	2.3	1.5	3.1	1.5	3.4	1.4	3.3
Brother MFC-9330CDW	2.1	4.7	1.7	3.9	1.8	4.3	1.9	4.1	2.0	6.1
Brother HL-3140CW	1.1	2.7	1.7	5.4	2.0	6.4	2.2	8.0	1.8	5.0
Samsung Xpress C1810W	1.2	4.0	1.5	3.4	1.8	3.9	1.6	3.5	1.3	3.0

During BLI's colour drift analysis, in which a FOGRA39 media wedge is submitted for print and then measured for colour consistency using EFI Color Verifier software, the Epson inkjet devices delivered impressively low mean Delta E drifts that ranged from 0.6 to 0.8, versus 1.0 to 2.2 from the laser models; though BLI's instruments detected these changes, they are likely to be invisible to the unaided eye. In terms of colour variance, the Epson WF-5690's colour variance remained largely stable, whilst the WF-5620's showed slightly more colour variance over the final 200- to 250-page test phase. The laser devices showed more colour variance over the full course of the test, with the Brother HL-3140CW in particular showing the greatest colour variance, with the highest peak Delta E reading of 8.0, which would be easily detected by the unaided eye.

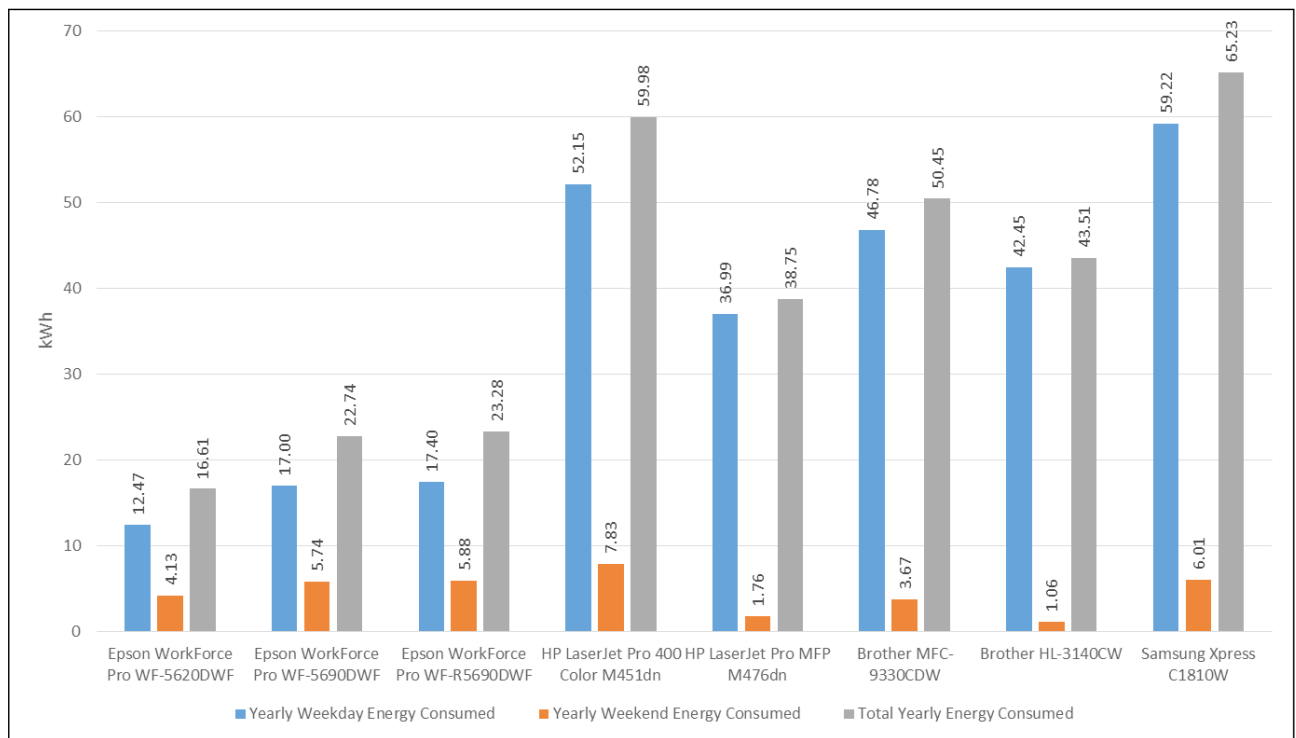
Environmental Testing

Energy Consumption

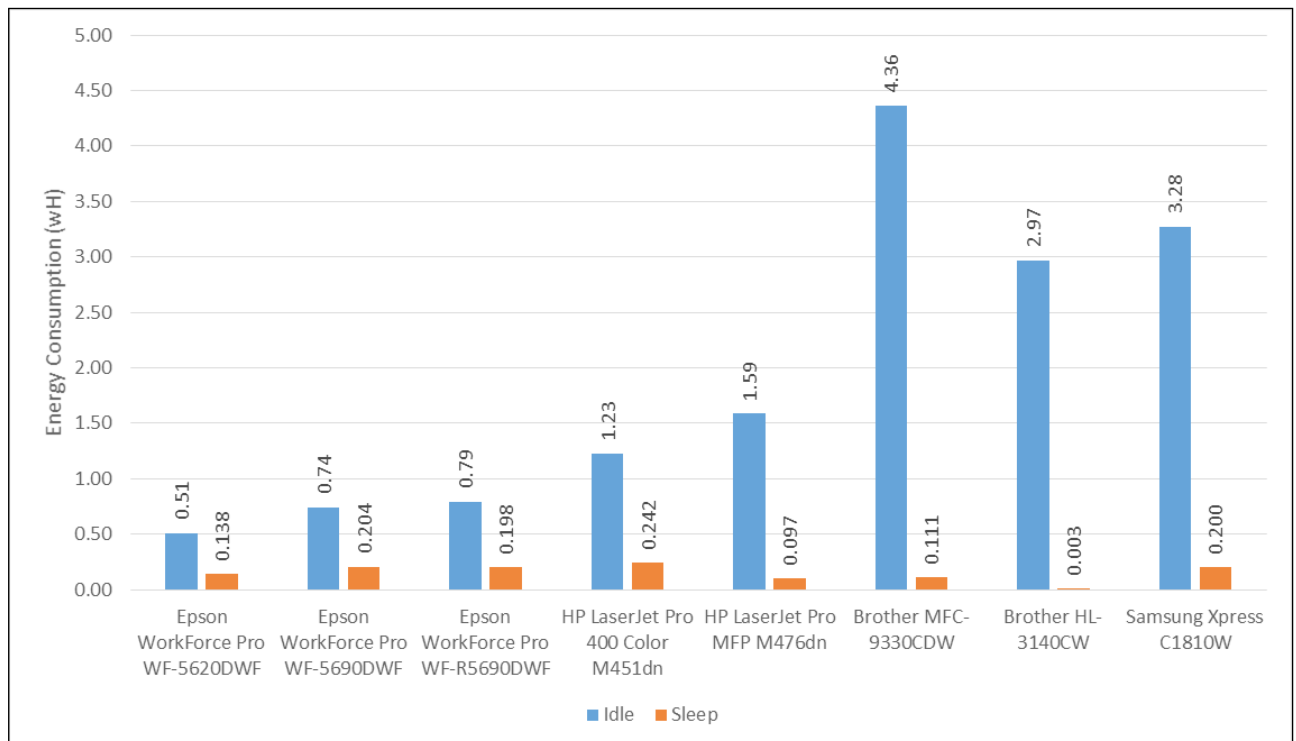
In BLI's environmental evaluation, devices were tested in default mode and in simplex only (as the Brother HL-3140CW and Samsung models lack a duplex capability), following BLI's proprietary standard energy consumption test methods. Total yearly energy consumption is calculated based on the total energy used during a typical workday, plus overnight and weekend sleep energy. Energy measurements were recorded using a Yokogawa WT210 energy meter.

The WF-5620 DWF, WF-5690 DWF and its sister RIPS model (WF-R5690 DTWF) all delivered impressive energy efficiency, offering by far the lowest overall projected weekday and annual energy consumption of the tested models. The Epson WF-5620 DWF, in particular, displayed the strongest performance, with an estimated annual energy consumption rate 57.1% lower than that yielded by its nearest laser rival (HP LaserJet Pro MFP M476dn), and 74.5% lower than that of the laser model with the highest projected energy consumption rate overall (Samsung Xpress C1810W).

Projected Weekday, Weekend and Yearly Energy Consumption (kWh)



Energy Consumption during Five Minutes in Idle and Sleep Modes (wH)



During five minutes in Sleep mode, all devices in the test group displayed low energy consumption, with the Brother HL-3140CW registering an exceptionally low 0.003 wH—98.5% lower than that (0.204 wH) of the Epson WF-5690 DWF. When remaining in their active ready state, the energy consumed by the inkjet devices is much lower than that of the laser models in the test group. The WF-5620 DWF consumed 58.5% less energy in idle mode than did the HP LaserJet

Pro 400 Color M451dn, the nearest laser model with the lowest energy consumption rate overall during five minutes in its active state (0.51 wH versus 1.23 wH), and it consumed over a third less energy than that of the Epson WF-5690 DWF and WF-R590 DTWF models.

Energy Consumed during Five Minutes Copying/Printing (wH)

Device	Five minutes copying				Five minutes printing			
	Mono simplex	Colour simplex	Mono duplex	Colour duplex	Mono simplex	Colour simplex	Mono duplex	Colour duplex
Epson WorkForce Pro WF-5620 DWF	1.73	1.64	1.43	1.38	1.82	1.81	1.27	1.27
Epson WorkForce Pro WF-5690 DWF	2.02	1.90	1.67	1.59	2.04	2.03	1.48	1.49
Epson WorkForce Pro WF-R5690DWF	2.00	1.84	1.68	1.62	2.14	2.15	1.54	1.53
HP LaserJet Pro 400 Color M451dn	Printer only device				30.43	30.88	21.40	22.02
HP LaserJet Pro MFP M476dn	29.19	28.28	22.35	27.33	31.05	28.49	22.34	23.55
Brother MFC-9330CDW	30.37	29.04	19.57	20.78	28.65	29.25	19.11	19.46
Brother HL-3140CW	Printer only devices				28.21	28.21	No duplex option	
Samsung Xpress C1810W					29.18	30.23		

When BLI evaluated the amount of energy used during five minutes of copying and printing in simplex/duplex and mono/colour workflows, the Epson WF-5620 DWF outclassed all tested models with the lowest energy consumption rates across the board. In fact, all three inkjet models demonstrated exceptionally low energy consumption recordings in both copy and print tests compared with the laser models. In simplex copy mode, the Epson WF-5620 DWF consumed 94.3% less energy in both monochrome and colour tests than did the Brother MFC-9330CDW which had the highest energy consumption. In duplex monochrome and colour copy modes, it consumed 93.6% and 95.0% less energy, respectively, than did the HP LaserJet Pro MFP M476dn.

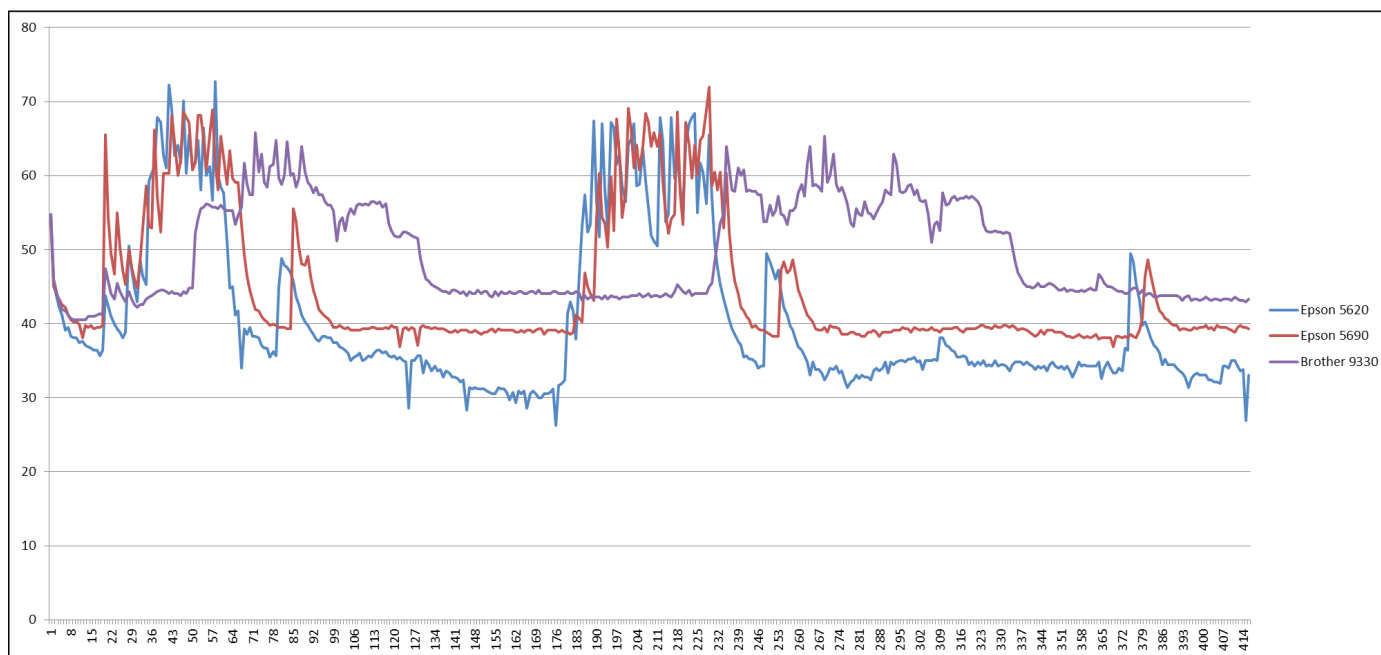
Similarly, the WF-5620 DWF's energy consumption rate in the five-minute print tests was 94.0% lower than the highest tested amounts of energy usage, which were recorded by the two HP laser models.

Noise Generation in Decibels

In accordance with BLI standard methodology, all devices were tested for noise emissions over a range of typical office activities for a period of three minutes. A four-page ISO test document was sent to print in simplex mode and then the device was left in idle state for one minute; the same job was sent as a duplex job and the device spent one more minute in idle state, after which the test was repeated for the duration of the three-minute period. Noise emissions were measured using an Extech sound level datalogger.

dBA	Epson WorkForce Pro WF-5690 DWF	Epson WorkForce Pro WF-5620 DWF	HP LaserJet Pro 400 Color M451dn	HP LaserJet Pro MFP M476dn	Brother MFC-9330CDW	Brother HL-3140CW	Samsung Xpress C1810W
Minimum	36.9	26.2	39.8	27.4	40.5	41.7	35.7
Maximum	72.0	72.7	67.2	67.7	65.8	69.6	69.6
Average	44.53	40.45	48.12	44.63	49.42	48.77	44.46

The Epson WF-5620 DWF produced the lowest average noise emissions (40.45 dBA) overall, followed by the Samsung Xpress C1810W (44.46 dBA) and the Epson WF-5620 DWF's sister model the WF-5690 DWF (44.53 dBA). The Brother MFC-9330CDW registered the highest average (22.2% higher than that of the WF-5620 DWF), however the highest peak noise emissions were delivered by the two inkjet devices. BLI analysts observed the Epson devices were capable of entering sleep mode at a faster rate than the laser models, which helped with noise reduction, whilst the Brother MFC-9330CDW took the longest to fall into sleep mode. The inkjets also tended to have longer quiet periods but would typically emit a sharp noise (reflected in their higher peak noise emission results) upon completing a print job, which BLI technicians attribute to the inkjet finishing process whereby the printhead is wiped and returns to its starting position.



Noise emissions recorded for the duration of the three-minute test for three devices: two Epson inkjets which delivered low noise emission averages and a Brother laser model which delivered the highest average noise emissions, overall. In between print jobs, the devices were sent to sleep for the duration of one minute; the inkjets clearly fall into sleep mode at a faster rate, compared to the Brother device, and exhibited longer quiet periods.

Space Requirements

	Length (cm)	Width (cm)	Height (cm)	Total volume (M3)
Epson WorkForce Pro WF-5690 DWF	95	46	58	0.253
Epson WorkForce Pro WF-5620 DWF	95	46	58	0.253
Epson WorkForce Pro WF-R5690 DTWF	104	100	71	0.738
HP LaserJet Pro 400 Color M451dn	110	42	33	0.152
HP LaserJet Pro MFP M476dn	112	42	76	0.358
Brother MFC-9330CDW	88	42	65	0.240
Brother HL-3140CW	100	42	52	0.218
Samsung Xpress C1810W	104	42	31	0.135

When evaluating the maximum space requirements for operation and maintenance tasks (e.g., access to misfeed areas and the replacement of consumables) there was little to distinguish between most of the test models. However, the Epson RIPs model, WF-R5680 DTWF with its large-sized ink cartridge side panels clearly requires more desk space than the rest. The non-RIPS Epson models are among the most compact devices, and require very little space for cartridge replacement compared with their laser competitors, some of which require the removal of the drum unit. While the Samsung Xpress C1810W and HP LaserJet Pro 400 Color M451dn are the smallest devices, they are print-only models.

Consumable Replacement



Epson WorkForce Pro WF-5690 DWF: Replacing ink cartridges is an extremely quick, easy and clean process. Users open the front cover and then push in the empty cartridge to release it (it's spring-loaded). Slots are colour-coded and cartridges are “keyed,” making the process foolproof.



Epson WorkForce Pro WF-R5690 DTWF: Replacing ink cartridge bags is a very straightforward process. Users open the side panel covers and then push in the button on the cartridge holder to release the bag. Slots are clearly colour-coded and keyed. New cartridge bags slide easily into place and can be clipped into position in a one-handed operation.



Brother HL-3140CW: Replacing consumables is straightforward. The toner cartridges lock into place on the drum unit; users need to open up the top cover panel before lifting out the cartridge assembly to eject it, then slide a new one into place. The cartridge positions are colour-coded.



Brother MFC-9330CDW: Consumables are easily replaceable following a similar procedure to that of the Brother ML-3140CW.



HP LaserJet Pro M451's consumables are accessed by opening the front cover and sliding out the consumables tray. The spent cartridge is simply pulled out for the new one to be inserted; while colour-coding assists users, cartridges are not "keyed" to prevent them from being placed in the wrong slots.



The HP LaserJet Pro M476dn's consumables are accessed by opening the front panel and sliding out the consumables tray. Toner cartridges can be slotted into place.



Samsung Xpress C1810W: Replacing toner is a simple and clean procedure. The cartridges are located within the body of the unit; users must open the front cover door, slide out the cartridge tray and simply lift out the cartridge to then insert the new cartridge.

Reliability Testing, Waste Generation and User Intervention

Printer reliability is a paramount concern for buyers given that a reliable device helps minimize downtime and boost worker productivity. Packaging and supplies waste management also have a significant impact on businesses, as well as on the environment. For example, managing supplies waste effectively can help reduce storage space requirements and costs, lower shipping/courier and disposal expenses, and have a positive impact on the environment. BLI conducted a 40,000-impression durability, consumables waste generation and user intervention comparative performance test on the Epson WorkForce Pro WF-5690 DWF, Epson WorkForce Pro WF-R5690 DTWF and the HP LaserJet Pro M476 device. Using the ISO24712 five-page test target, the 40,000 page test was conducted over 20 business days per device, using a variable test schedule to simulate real-world usage (for instance, varying run lengths, incorporating periods of high and low print volumes, as well as periods of inactivity).

Reliability

During this test, both the Epson WorkForce Pro WF-5690 DWF and HP LaserJet Pro M476 produced a faultless reliability performance and experienced no misfeeds or component failures, nor experienced any image quality issues. Similarly, the Epson WorkForce Pro WF-R5690 DTWF did not have any component failures, nor did it require any service calls. However, the device did experience three misfeeds, which all occurred in the duplex unit located at the rear. While these misfeeds were easy to remove, it did involve the technician turning the device around. Furthermore, the WF-R5690 DTWF experienced image quality issues at the 6,892- and 29,119-impression mark, whereby the device started creating output exhibiting slight streaking on the pages. BLI technicians conducted a print head cleaning cycle each time which eliminated the image quality issues.

Model	Total Misfeeds	Misfeed Rate	Service Calls	Other issues	TOTAL
Epson WorkForce Pro WF-5690 DWF	0	NA	0	0	0
Epson WorkForce Pro WF-R5690 DTWF	3 (meter: 19,491, 20,267, 29,680)	13,333	0	2	5
HP LaserJet Pro M476dn	0	NA	0	0	0

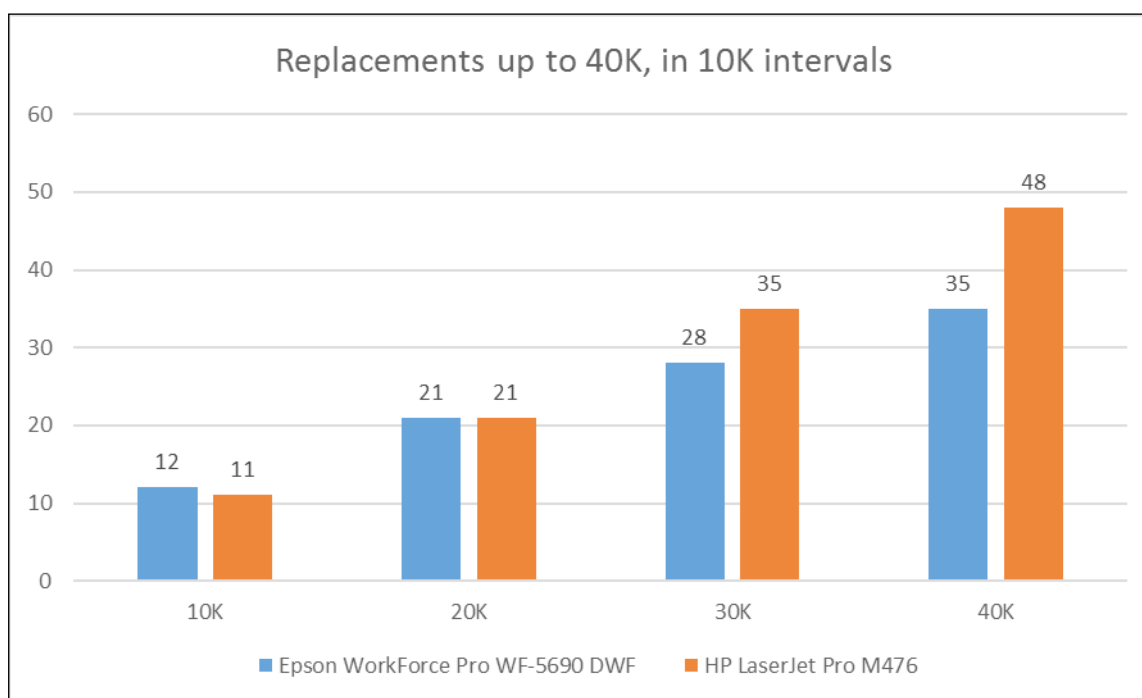
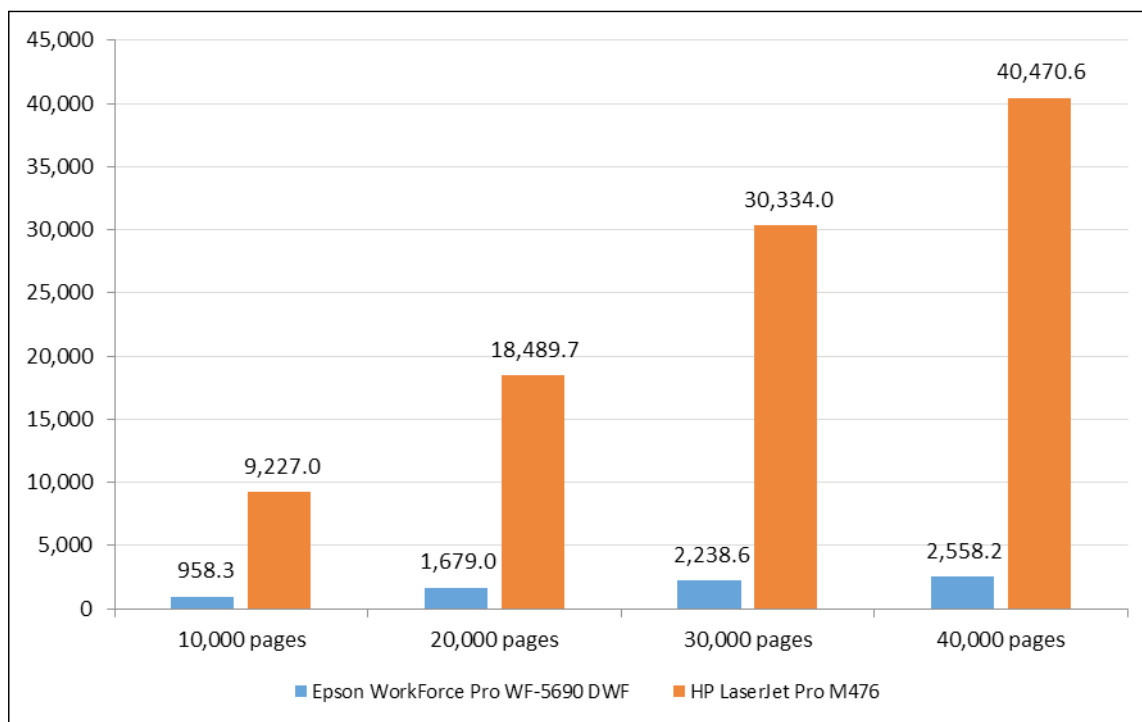
Waste Generation

To assess the comparative amount of waste material generated over the course of 40,000-impression run, BLI assessed all consumables waste including toner/ink cartridges, imaging units, waste toner bottles, and any maintenance kit items required, with all items being retained, weighed and photographed. All toner/ink cartridges were run to exhaustion or until image quality was deemed to have dropped below an acceptable standard for external usage. There was no waste incurred by the Epson WF-R5690 DTWF in this test, not surprising given the RIPS cartridge packs' rated yield of 50,000. The Epson WF-5690DWF not only used far fewer cartridges than the HP model to print 40,000 pages (resulting in fewer interruptions to workflow to change supplies), but also produced significantly low amounts of consumables and packaging waste over the test when compared to that of the HP device—in fact, as much as 93.7% less by weight. The total weight of all cartridges and cartridge packaging required to print 40,000 pages was just 2,558.2 grams for the Epson device, compared with 40,470.6 grams for the HP model.

Total Supplies and Consumables Waste Generated (in grams)

Model	Consumables and packaging waste (10,000 pages)	Consumables and packaging waste (20,000 pages)	Consumables and packaging waste (30,000 pages)	Consumables and packaging waste (40,000 pages)
Epson WorkForce Pro WF-5690 DWF	958.3	1,679.0	2,238.6	2,558.2
Epson WorkForce Pro WF-R5690 DTWF	0	0	0	0
HP LaserJet Pro M476dn	9,227.0	18,489.7	30,334.0	40,470.6

Total Supplies and Consumables Waste Generated (in grams)





Waste after 10,000 impressions. Epson WF-5690 DWF consumables (left) vs. HP M476dn consumables (right).



Waste after 20,000 impressions. Epson WF-5690 DWF consumables (left) vs. HP M476 consumables (right).



Waste after 30,000 impressions. Epson WF-5690 DWF consumables (left) vs. HP M476dn consumables (right). HP consumables used at the 30,000-impression mark total 35, while the Epson device required 28 consumable replacements.



Waste at the end of the 40,000-impression test. Epson WF-5690 DWF (left) required 35 consumable replacements to complete the test while the HP M476dn needed 48 separate items.

User Intervention

	Epson WorkForce Pro WF-5690 DWF	HP LaserJet Pro M476dn	% Time saving with the Epson vs. HP
Toner/Ink Cartridge Replacement	35	48	
Time per change	30 seconds	60 seconds	
Total User Intervention Time*	17.5 minutes	48 minutes	63.5%

* Note, this does not include operator time required to attend to the device, determine supplies out, order/obtain supplies, return to the device, all of which will add further time per intervention.

The Epson WF-5690 DWF office saves 30.5 minutes of worker time over 40,000 impressions, compared to the HP LaserJet Pro 476.

Drying Time Due to Inactivity

In BLI's evaluation to determine the impact on the Epson inkjet devices when left inactive for prolonged periods of time, Epson inkjet devices were left powered off for one month, two months, three months and six months. At the end of each stage, the devices were switched on and a single-page colour BLI test target was sent to print, with the results assessed to determine if there were any issues which may require an automatic or manual cleaning cycle to resolve. At the one-, two- and three-month mark, there were no issues observed by BLI's technicians, nor were there any problems with nozzle clogging. At the end of the six-month period, there were no issues reported with the WF-5690 DWF. Conversely, the Epson A4 RIPS model experienced nozzle-clogging issues with the black printhead, with some streaking and faintness evident in black solid areas. BLI technicians performed two cleaning cycles (two minutes per clean cycle) which rectified the issues.

Test Environment

Testing was conducted in BLI's European test lab, in an atmospherically controlled environment monitored by a 24/7 Dickson Temperature/RH chart recorder, ensuring that typical office conditions were maintained. All paper used in testing was allowed to acclimatize inside the facility for a minimum of 12 hours before being used.

Test Equipment

BLI's dedicated test network in Europe, consisting of Windows 2008 servers, Windows 7 workstations, 10/100/1000BaseTX network switches and CAT5e/6 cabling.

Test Procedures

BLI's lab testing includes both BLI proprietary and industry-standard test procedures and documents. In addition to a visual image quality evaluation, optical density of primary colour (CMYK) solid fill output is measured using a densitometer, and colour gamut and consistency are evaluated using a colour spectrophotometer.

About Buyers Laboratory LLC

Buyers Laboratory LLC (BLI) is the world's leading independent provider of analytical information and services to the digital imaging and document management industry. For more than 50 years, buyers have relied on BLI to help them differentiate products' strengths and weaknesses and make the best purchasing decisions, while industry sales, marketing and product professionals have turned to BLI for insightful competitive intelligence and valued guidance on product development, competitive positioning and sales channel and marketing support. Using BLI's web-based bliQ and Solutions Center services, 40,000 professionals worldwide create extensive side-by-side comparisons of hardware and software solutions for over 15,000 products globally, including comprehensive specifications and the performance results and ratings from BLI's unparalleled Lab, Solutions and Environmental Test Reports, the result of months of hands-on evaluation in its US and UK labs. The services, also available via mobile devices, include a comprehensive library of BLI's test reports, an image gallery, hard to find manufacturers' literature and valuable tools for configuring products and calculating total cost of ownership (TCO) and annual power usage. BLI also offers consulting and private, for-hire testing services that help manufacturers develop and market better products and consumables.

For more information on Buyers Laboratory LLC, please call +44 (0) 118-977-2000, visit www.buyerslab.com, or email david.sweetnam@buyerslab.com.

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