

# HP PageWide Technology

## Quality and speed together



Balancing speed, quality, and cost in printing applications once meant sacrificing one benefit for another. Today, HP PageWide Technology overcomes these trade-offs with revolutionary and scalable designs that deliver quality and speed together—at a significant cost advantage—based on the latest HP printing innovations built on proven technologies.

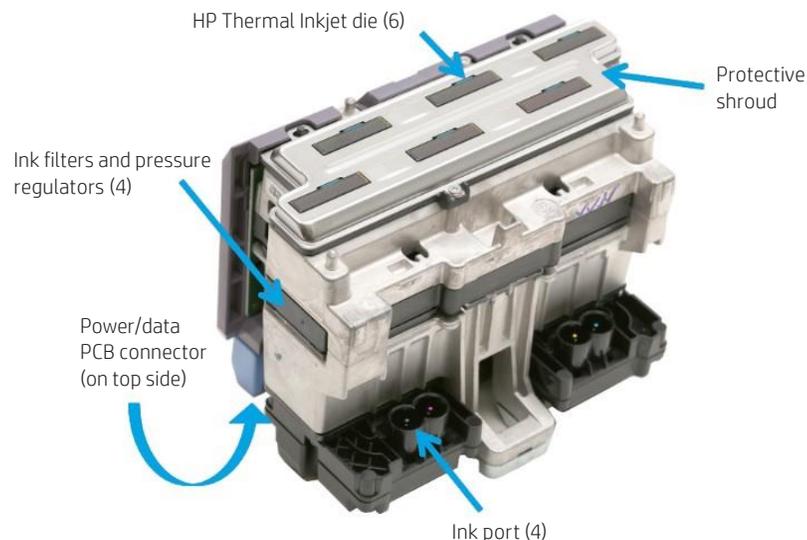
### Outstanding quality and high productivity

A common expectation for digital printing is that you can't have it all: if you need to print faster, then you should expect lower quality; if you need the highest quality, then you must accept lower productivity. Nearly a decade ago, HP's investments in printing technology began to challenge that expectation with the introduction of HP Scalable Printing Technology—SPT. SPT includes printhead technologies, advanced inks, materials, design rules, and precision production methods based on integrated circuit manufacturing. SPT accelerated the pace of HP printing innovation by delivering printheads that are scalable in size, features, and performance while leveraging proven designs into new applications. HP PageWide Technology is the latest HP printing innovation powered by HP SPT.

By moving only the paper under a page-wide, stationary printhead, HP PageWide Technology overcomes the trade-offs between quality and speed in traditional inkjet printers. The benefits are speed and quality together with lower costs and less energy use than in-class business printers.<sup>1,2,3</sup> Today, HP PageWide Technology underlies the performance of HP PageWide Web Presses, HP PageWide Pro and Enterprise business printers, and HP PageWide XL large-format printers. Tomorrow, HP PageWide Technology will be used in HP's 3D printers based on Multi Jet Fusion Technology.

Figure 1 shows the HP 841 Printhead used in HP PageWide XL printers. The S-shape of the modules allows them to be stacked seamlessly across the width of the paper to build printers in different formats. For example, eight modules are used in the D-size (A1) HP PageWide XL 8000 printer. Each module can print four colors of HP pigment ink in a print swath 5.8-inch (129 mm) wide. The module has on-board ink filters, pressure regulators and connectors for power, data, and ink. Used modules are easily removed and replaced by the user.<sup>4</sup>

**Figure 1.** HP 841 Printhead used in HP PageWide XL printers



This printhead is built from six (6) precision-aligned HP Thermal Inkjet silicon chips—called “die”—protected by a stainless steel shroud.<sup>5</sup> Each die has 6,336 nozzles for a total of 25,344 nozzles on the module. The native printing resolution of this printhead—1,200 dots per inch—delivers both speed and quality.

## The evolution of HP PageWide innovation

Figure 2 shows the evolution of HP PageWide printheads. In 2006, the first application of HP PageWide Technology used 4.25-inch (108 mm) wide bi-color printheads in the HP CM8060 MFP—a workgroup multifunction color printer. This printhead has two independent ink supplies and two columns of 5,280 nozzles at 1,200 nozzles per inch (10,560 total nozzles). It can be used as a bi-color printhead or as a single-color printhead. For high-speed commercial applications served by HP PageWide Web Presses, using one color of ink in both columns provides “4-times” nozzle redundancy: four nozzles can print in each 600 dpi dot row down the web.

In 2008, the HP T300 Color Inkjet Web Press<sup>6</sup> was introduced using 140 4.25-inch (108 mm) printheads in a duplex press printing a 30-inch (762 mm) web at up to 400 feet (122 m)/minute. Today, the HP PageWide Web Press T400 family use 200 HP A51 Printheads<sup>7</sup> to print duplex at up to 800 feet (244 m)/minute on a 42-inch (1060.4 mm) web. Introducing in 2016, the HP PageWide Web Press T1100S, designed for corrugated packaging applications, using 260 printheads, prints a 110-inch (2.8m) web at speeds up to 600 feet (182.9 m) per minute.

In 2013, the HP Latex 3000 Printer was introduced using seven (7) 4.25-inch (108 mm) printheads on a scanning carriage to produce a wide print swath.

**Figure 2.** Four generations of HP PageWide printheads

<b>2006</b>		HP 4.25-inch (108 mm) printhead	HP Latex Printers   HP PageWide Web Presses
<b>2013</b>		HP 8.57-inch (217.7 mm) printhead	HP PageWide business printers
<b>2015</b>		HP 5.08-inch (129 mm) printhead	HP PageWide large-format printers
<b>2016</b>		HP 4.25-inch (108 mm) printhead with HDNA	HP PageWide Web Presses (HD)

Based on technology proven in HP PageWide Web Presses—more than 130 billion pages printed since 2008 and more than 4 billion pages per month<sup>8</sup> produced under demanding commercial printing conditions—HP’s next generation of HP PageWide Technology was introduced for business and enterprise applications in 2013 with the HP X-Series business printers and in 2016 with the HP PageWide business printers. This 8.57-inch (217.7 mm) printhead incorporates significant technology advances: four colors of ink, 10,560 nozzles per color, and 1,200 nozzles per inch for a total of 42,240 nozzles on the printhead.

In 2015, HP introduced the HP PageWide XL family of high-productivity large-format printers using the 5.08-inch (129 mm) HP 841 Printhead.

In 2016, HP will introduce High Definition Nozzle Architecture—HDNA—in HP PageWide Web Presses. HDNA uses the high-definition capabilities of SPT to place low drop weight nozzles between existing (high drop weight) nozzles on the 4.25-inch (108 mm) printhead. This provides dual drop weight printing with twice the number of nozzles—21,120 at 2,400 nozzles per inch—for a breakthrough in quality and performance in high-speed production printing.

## Reliable one-pass printing

HP PageWide Technology gets its speed by printing in a single pass, but achieving reliable quality requires innovation and advanced technologies in printheads, printhead service stations, inks, and paper transport.

To precisely place a dot of ink each nozzle must eject a drop when it is required and within tight tolerances on speed, direction, and drop weight. A service station in the printer checks each nozzle’s performance and determines if it is operating properly. Using HP’s optical drop detectors—that can see individual drops in-flight—1000’s of nozzles can be checked every second. The service station cleans, wipes, and caps the printhead, and it can restore nozzles to operation. But if a nozzle cannot be recovered immediately, then HP PageWide Technology uses both passive and active methods to substitute good nozzles for bad ones suppressing artifacts such as white streaks down the page.

HP develops advanced pigment inks in its own laboratories to meet the unique requirements of HP PageWide Technology. HP pigment inks produce high black density and a wide gamut of vivid, saturated colors in a single pass. Prints are dry and ready to use right out of the printer. Compared to dye-based inks on plain and low-cost papers, HP pigment inks offer superior durability: resistance to damage from water, highlighters, dry smudge, and light fade.<sup>9</sup>

Inks are an essential part of reliable drop ejection. Whenever a printhead is uncapped and exposed to air, water in the ink quickly evaporates from nozzles that are about one-fifth the diameter of a human hair. If the printhead is left uncapped for more than a few seconds, the ink thickens in the nozzles making it difficult to eject a drop.

Business printers and large-format printers using HP PageWide Technology can eject a few drops between pages (or large-format sheets of paper) to refresh the ink in the nozzles. However, they still must print every drop reliably for several seconds while uncapped. HP PageWide Web Presses eject drops from every nozzle every fraction of a second on the web in the space between image frames. This technique both services the nozzles and allows built-in vision systems to evaluate nozzle performance.

In HP PageWide Technology, the accuracy of dot placement across the paper is built-in by nozzle placement on the printhead. Properly placing dots along the page requires precision mechanics to load and transport paper and sensors to coordinate drop ejection with paper motion.

HP PageWide Technology has proven reliability in the office. In two separate tests, Buyers Laboratory, Inc. found that business printers using HP PageWide Technology outperformed competitive products in reliable operation.<sup>3,10</sup> According to the independent-testing company, the HP Officejet Pro X551dw printed more than 500,000 pages without failure.

## Proven technologies – built to perform and last

Introducing a new technology into a business is both an investment in the future and an expression of confidence in the technology and the company that provides it. For more than three decades, HP has delivered printing solutions businesses can depend on. And, new applications of HP PageWide Technology are based on proven, reliable designs and technologies.

With fewer moving parts and simple user-replacement of printheads,<sup>4</sup> printers using HP PageWide Technology are designed and built to be robust. They provide easy maintenance and can support high-duty print cycles— HP PageWide Pro and Enterprise printers have a recommended monthly page volume of 2,000 to 7,500 pages.<sup>11</sup> HP PageWide business and enterprise printers and HP PageWide XL Printers reduce the amount of user intervention with large ink and paper supplies, automatic printhead servicing, automatic closed-loop printhead alignment, and automatic color calibration. Precision paper handling delivers both speed and quality with reliability users can count on during unattended operation.

## Competitive costs that support your bottom line

Regardless of performance or durability, cost can often stand in the way of adopting a new technology. HP PageWide Technology eliminates this barrier by delivering low costs-per-page for both black and color printing by using low-cost papers specific to each application. For example, HP PageWide Technology and HP pigment inks support plain papers and ColorLok<sup>®</sup> papers in the office; coated and uncoated standard offset papers and ColorPRO inkjet coated and uncoated papers in commercial web printing; and uncoated papers, bond paper, matte and satin poster papers, heavyweight coated paper, vellum, and matte polypropylene in large-format printing

Because HP PageWide Technology is scalable in width and performance, it can support a versatile range of media types, sizes, and weights to meet a variety of applications and printing cost requirements. And, total cost-per-page is kept low because the printheads are designed to deliver a long service life.

## Solutions to your business needs

HP PageWide Technology spans applications from the office to commercial and industrial printing to provide solutions offering speed, quality, and economy.

### **HP PageWide business and enterprise printers: breakthrough speed and professional quality in the office**

- Up to 75 black or color pages per minute, up to two times faster than laser printers<sup>12</sup>
- Substantial cost savings with the low total cost of ownership.<sup>13</sup>
- Up to 84% less energy consumption per page than lasers and ENERGY STAR<sup>®</sup> certification<sup>2,3</sup>
- Compatibility with corporate enterprise networks for management and workflow solutions.
- More reliable operation compared to competitive printers and high-volume printing without failure.<sup>10</sup>

## **HP PageWide XL: high-productivity, large-format production printing**

- Up to 30 D/A1 pages/minute and 1500 D/A1 pages/hour in monochrome and color
- Monochrome and color at speeds up to 60% faster than the fastest monochrome LED printer<sup>14</sup>
- Durable, moisture- and fade-resistant prints—even on uncoated bond paper<sup>15</sup>
- Print on a wide range of media up to 40-in (1 m)—covering ISO/US technical and offset standards
- Simple printer management with built-in, automatic, closed-loop alignment and color calibration.

## **HP PageWide Web Presses: proven results in commercial printing**

- Web widths from 22 inches (558.8 mm) to 110 inches (2794 mm).<sup>16</sup>
- Simplex and duplex printing configurations.
- Monochrome and color at speeds up to 600 ft. (183 m)/minute, mono up to 800 ft. (244 m)/min, and color at up to 800 ft. (244 m)/min in Productivity Mode in HP T480HD presses with HDNA.<sup>17</sup>
- Durable, moisture- and fade-resistant prints—even on uncoated offset paper.<sup>18</sup>
- Print on a wide range of uncoated and coated offset papers and papers with ColorPro Technology.
- Workflow solutions designed to increase operational efficiencies and expand production capabilities.
- Streamlined, dependable operation with built-in automatic quality control.<sup>19</sup>
- In-line and near-line coating and priming solutions for packaging applications with HP aqueous primers and third-party overprint varnish.

## **Powering the future of printing**

Because of its scalability, broad media versatility, and ability to provide reliable quality and speed together at competitive costs, SPT and HP PageWide Technology have the potential to transform a wide range of printing applications in both HP's current and future businesses.

Today, printing solutions based on HP PageWide Technology offer businesses the opportunity to take their printing expectations to higher levels and move beyond the trade-off of quality and speed imposed by traditional inkjet printing solutions.

Tomorrow, HP Scalable Printing Technology will advance printing off the page into the realm of 3D manufacturing enabling the production of components with properties and features practically unavailable—and even unimaginable—with current machining methods.

### **Learn more about how HP PageWide Technology can work for your business:**

#### **Business printers**

[hp.com/go/pagewidebusiness](http://hp.com/go/pagewidebusiness)

#### **Large-format printing**

[hp.com/go/largeformatpagewide](http://hp.com/go/largeformatpagewide)

#### **High-speed production solutions**

[hp.com/go/pagewidewebpress](http://hp.com/go/pagewidewebpress)

#### **3D printing solutions**

[hp.com/go/3Dprinting](http://hp.com/go/3Dprinting)

#### **Learn more at**

[hp.com/go/pagewide](http://hp.com/go/pagewide)

1. Total cost of ownership comparison based on 1,500 pages per month over 5 years, manufacturers' published specifications for page yields and energy use, manufacturers' suggested retail prices for hardware and supplies, cost per page based on ISO yield with continuous printing in default mode with highest-available-capacity cartridges, long-life consumables of all color business A4 printers \$500–\$1,249 USD as of November 2015, excluding products with 1% or lower market share using market share as reported by IDC as of Q3 2015. Learn more at [hp.com/go/pagewidebusiness](http://hp.com/go/pagewidebusiness) and [hp.com/go/learnaboutsupplies](http://hp.com/go/learnaboutsupplies).
2. As of September 2014, based on the HP PageWide Technology printhead life cycle assessment (LCA) results. LCA of HP PageWide Technology printhead commissioned by HP and conducted by PE International.
3. Energy claim based on TEC data reported on [energystar.gov](http://energystar.gov). Data normalized to determine energy efficiency of majority of in-class business printers \$300–\$800 USD and MFPs \$400–\$1,000 USD as of November 2015; market share as reported by IDC as of Q3 2015. Actual results may vary. Learn more at [hp.com/go/pagewideclaims](http://hp.com/go/pagewideclaims).
4. Printheads in HP PageWide Web Presses and large-format PageWide printers are user-replaceable with a simple unlatch/pull-out/snap-in/latch operation. No tools, handling of electrical and ink connections, or mechanical alignment are required. PageWide printheads in HP Officejet Pro and Enterprise series and PageWide Pro and Enterprise Color series are not user-serviceable and are designed for the life of the printer. Where available, used HP printheads can be recycled through the HP Planet Partners Program. For more information, see [hp.com/revcycle](http://hp.com/revcycle).
5. The term “die” comes from integrated circuit manufacturing and refers to a silicon “chip”. The shroud protects the die from mechanical damage and provides a sealing surface for the cap in the printhead service station.
6. Now designated the HP PageWide Web Press T300 Color.
7. This is the second generation of the 4.25-inch (108 mm) printhead for use in HP PageWide Web Presses.
8. Based on customer use data compiled by HP PageWide Web Press Division as of Nov 2015.
9. Fade resistance based on paper industry predictions for acid-free papers and Original HP inks; colorant stability data at room temperature based on similar systems tested per ISO 11798 and ISO 18909. Water resistance based on HP internal testing, using paper with the ColorLok® logo.
10. BLI Custom Test Report HP Officejet Pro X551 dw vs. Competitive Laser Models, Sales Battlecard, U140801959. For more information, see [hp.com/united-states/campaigns/media/blireport.pdf](http://hp.com/united-states/campaigns/media/blireport.pdf)
11. HP recommends that the number of pages per month of imaged output be within the stated range for optimum device performance, based on factors including supplies replacement intervals and device life over an extended warranty period.
12. Comparison based on manufacturers' published specifications of fastest available color mode of color business A4 printers \$500–\$1,249 USD as of November 2015, excluding other HP PageWide products, and products with 1% or lower market share using market share as reported by IDC as of Q3 2015. HP PageWide speeds based on General Office mode and exclude first page. Learn more at [hp.com/go/printerspeeds](http://hp.com/go/printerspeeds).
13. Total cost of ownership comparison based on 90,000 pages, manufacturers' published specifications for page yields and energy use, manufacturers' suggested retail prices for hardware and supplies, cost per page based on ISO yield with continuous printing in default mode with highest-available-capacity cartridges, long-life consumables of all color business printers \$300–\$800 USD and MFPs \$400–\$1,000 USD as of November 2015, excluding products with 1% or lower market share using market share as reported by IDC as of Q3 2015. Learn more at [hp.com/go/pagewideclaims](http://hp.com/go/pagewideclaims) and [hp.com/go/learnaboutsupplies](http://hp.com/go/learnaboutsupplies).
14. With a maximum linear speed of 23 meters/minute (75 feet/minute), an HP PageWide large-format printer is 60% faster than the KIP 9900 printer which, at 14 meters/minute (47 ft./minute), is the fastest rated LED printer as of March, 2015.
15. Based on HP internal testing. Evaluation of prints produced with HP PageWide large-format printers and HP DuraTone Pigment Ink shows equivalent or better results compared to prints produced with HP 970/971/980 inks that are fade and moisture resistant per ISO 11798 Permanence and Durability Methods certification.
16. HP PageWide Web Presses are available in T200, T300, T400, and T1100S families. See [hp.com/go/pagewidewebpress](http://hp.com/go/pagewidewebpress) for details.
17. HP PageWide Web Press T400-series.
18. Based on HP internal testing and third-party results.
19. Optional equipment may be required.

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