

Total cost of printing

Original HP inks vs. non-HP inks for Designjet T-series printers



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Executive summary

In June, 2013, Hewlett-Packard conducted tests of the reliability of three market leading non-HP ink cartridges sold as substitutes for the HP 72 Ink Cartridges for the HP Designjet T1200 HD Multifunction Printer, T1300 ePrinter, and T2300 eMultifunction Printer. Impacts on the reliability of other components and productivity were also noted.¹

In the tests, each of the brands of non-HP ink tested performed poorer on several metrics compared to HP's ongoing internal testing of Original HP inks.

The test results indicate there may be significant hidden costs of using non-HP inks potentially offsetting all of the perceived savings from buying non-HP inks.

Key reliability and productivity findings that may impact costs include:

- All non-HP inks tested had higher ink supply failure rates than Original HP inks.
- Use of all non-HP inks tested was associated with reduced printhead reliability including higher printhead failures, shorter printhead life, and decreased printhead performance that contributed to banding and other print quality problems.
- Decreased printhead performance led to increased ink and media usage for non-printing purposes: printhead cleaning routines in attempts to restore print quality and reprinting plots with unacceptable print quality.
- Ink cartridge and printhead reliability issues led to increased labor time: installation and ordering of extra ink cartridges and printheads, printhead cleaning routines in attempts to restore print quality, and reprinting.

One of the most dramatic effects found in testing was the impact of non-HP ink on printhead reliability and functionality including resulting problems with print-quality

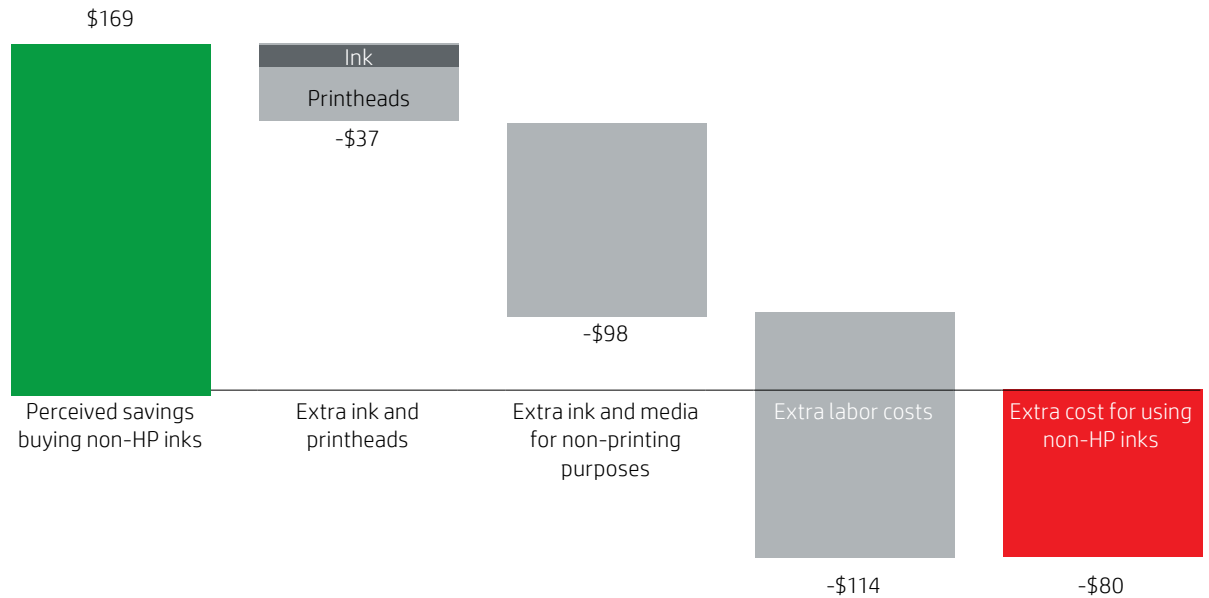
This document will quantify the potential impact of these costs for typical annual usage of T-series printers. Assumptions used in the calculations below can be found in the Appendix.

¹ Complete test report, including results and methodology, is available hp.com/go/hpinkswitepaper

Total cost of printing difference

While there is a perceived cost advantage to purchasing non-HP inks, taking into account failure rates of ink cartridges and printheads and the associated ink used for non-printing purposes and the extra labor changes the story.

Total cost of printing: Non-HP inks vs. Original HP inks



Cost calculations

Typical annual ink usage

| Brand | Original HP ink | Non-HP ink tested average |
|--|--------------------|---------------------------|
| Square meters (m ²) printed/year | 960 m ² | 960 m ² |
| Milliliters (ml)/m ² | 0.90 ml | 0.90 ml |
| Ink use for printing/year | 864 ml | 864 ml |
| Ink use/printhead cleaning | 16 ml | 16 ml |
| Printhead cleaning/year | 32 ml | 379 ml |
| Total ink use/year (printing and non-printing purposes combined) | 896 ml | 1,243 ml |

Perceived cost differences

| Brand | Original HP ink cartridges | Non-HP ink cartridges tested average | Perceived savings purchasing non-HP inks |
|--|----------------------------|--------------------------------------|--|
| Average street price per cartridge ² | \$59.98 | \$34.49 | |
| Cost of ink used/year (ink usage for printing purposes only) | \$398.66 | \$229.25 | \$169.41 |

Extra ink cartridge purchases³

| Brand | Original HP ink | Non-HP ink tested average | Difference: Extra ink purchases using non-HP ink |
|---|-----------------|---------------------------|--|
| Failure rate (non-dead on arrival) | 0.12% | 3.10% | |
| Cost of ink used/year (ink usage for both printing and non-printing purposes) | \$413.54 | \$329.84 | |
| Extra cartridge cost due to failures | \$0.49 | \$10.22 | \$9.73 |

² See Appendix for details.

³ Assumes dead-on-arrival (DOA) cartridges are reimbursed by the supplier.

Extra printhead purchases

| Brand | Original HP ink | Non-HP ink tested average | Difference: Extra printhead purchases using non-HP ink |
|-------------------------------|------------------------|----------------------------------|---|
| Printhead life | 2700 ml | 1715 ml | |
| Printhead life/printhead set | 8100 ml | 5145 ml | |
| Street price/printhead set | \$209.97 | \$209.97 | |
| Annual usage | 896 ml | 1243 ml | |
| Printhead cost per ml printed | \$ 0.03 | \$ 0.04 | |
| Annual printhead cost | \$ 23.23 | \$ 50.73 | \$27.50 |

Extra ink and media use for non-printing purposes: Printhead cleaning

| Brand | Original HP ink | Non-HP ink tested average | Difference: Extra ink used for non-printing purposes using non-HP ink (printhead cleaning) |
|---|------------------------|----------------------------------|---|
| Printhead cleanings/year | 2 | 24 | |
| ML used per printhead cleaning | 16 ml | 16 ml | |
| ML used in printhead cleaning/year | 32 ml | 379 ml | |
| \$/ml | \$0.46 | \$0.27 | |
| Cost of ink used in printhead cleaning/year | \$14.77 | \$100.47 | \$85.71 |

Extra ink and media use for non-printing purposes: Reprinting

| Brand | Original HP ink | Non-HP ink tested average | Difference: Extra ink used for non-printing purposes using non-HP ink (reprinting unacceptable plots) |
|---|------------------------|----------------------------------|--|
| Unacceptable plots | 5% | 8% | |
| Media waste | 48 m ² | 80 m ² | |
| Ink waste | 43.2 ml | 72 ml | |
| Ink cost/ml | \$0.46 | \$0.27 | |
| Media cost/m ² | \$0.47 | \$0.47 | |
| Cost of ink & media for reprinting due to unacceptable print quality/year | \$40.24 | \$52.94 | \$12.71 |

Extra labor costs:⁴ Installing and ordering extra cartridges

| Brand | Original HP ink | Non-HP ink tested average | Difference: Extra labor (installing and ordering extra ink cartridges) |
|--|------------------------|----------------------------------|---|
| Total ml/year | 896 ml | 1243 ml | |
| ML/cartridge | 130 ml | 130 ml | |
| Failure rate | 0.3% | 7.8% | |
| Cartridge failures/year | 0.02 | 0.74 | |
| Labor per installation | 10 minutes | 10 minutes | |
| Labor per order | 30 minutes | 30 minutes | |
| Labor cost to install and order cartridges | \$0.13 | \$4.94 | \$4.81 |

Extra labor costs: Installing and ordering extra printheads

| Brand | Original HP ink | Non-HP ink tested average | Difference: Extra labor (installing and ordering extra printheads) |
|--|------------------------|----------------------------------|---|
| Printhead life | 2700 ml | 1715 ml | |
| Total ml/yr | 896 ml | 1243 ml | |
| Printheads used/year | 0.33 | 0.72 | |
| Labor per installation | 15 minutes | 15 minutes | |
| Labor per order | 30 minutes | 30 minutes | |
| Labor cost to install and order printheads | \$ 2.49 | \$5.45 | \$ 2.96 |

⁴ A labor cost of \$10/hour is assumed in all calculations in this section.

Extra labor costs: Printhead cleaning

| Brand | Original HP ink | Non-HP ink tested average | Difference: Extra labor (printhead cleaning) |
|---|------------------------|----------------------------------|---|
| Printhead cleanings/year | 2 | 24 | |
| Labor per cleaning | 5 minutes | 5 minutes | |
| Cost of labor used in cleaning per year | \$1.67 | \$20.00 | \$18.33 |

Extra labor costs: Reprinting

| Brand | Original HP ink | Non-HP ink tested average | Difference: Extra labor (reprinting unacceptable plots) |
|--|------------------------|----------------------------------|--|
| Unacceptable plots | 5% | 8% | |
| Media wasted | 48 m ² | 80 m ² | |
| Labor per reprint | 15 minutes | 15 minutes | |
| Cost of labor used for reprinting/year | \$120.00 | \$200.00 | \$80.00 |

Extra labor costs: Refilling

| Brand | Original HP ink | Non-HP ink tested average⁵ | Difference: Extra labor (refilling cartridges with a non-HP refill kit) |
|------------------------------------|------------------------|--|--|
| Labor time to refill one cartridge | - | 5 minutes | |
| Total refilling labor time/year | - | 0.8 hours | |
| Cost of labor for refilling | \$0 | \$8.00 | \$8.00 |

⁵ One of the three non HP-brands tested was a refill kit. In testing, total time to refill a cartridge with a refill kit was 10 minutes for 80ml.

Appendix: Assumptions and sources

Ink cartridge street prices

| Cartridges sold as substitutes for | HP street price | Brand A street price ⁶ | Brand B street price | Brand C street price | Brand D street price |
|------------------------------------|-----------------|-----------------------------------|----------------------|----------------------|----------------------|
| HP 72 130-ml Ink Cartridges | \$59.98 | \$39.98 | \$9.09 per 130 ml | \$54.41 | \$34.49 |

Street prices are from: Prices paid for test cartridges and supplier websites.

HP printhead street prices

| Printheads used in test | HP street price |
|---|-----------------|
| HP 72 Printheads | \$69.99 |
| Printhead set includes 3 printheads: Magenta and Cyan (C9383A) Matte Black and Yellow (C9384A) Gray and Photo Black (C9380A) | \$209.97 |
| Street price is from: hp.com | |

Labor rate and times

| | |
|--|------------|
| Labor rate for printer operator | \$10/hour |
| Labor time to replace failed ink supply | 10 minutes |
| Labor time to install a printhead | 15 minutes |
| Labor time to reorder failed ink supply or printhead | 30 minutes |
| Labor time to run the printhead cleaning routine | 5 minutes |

⁶ For brands included in test, see test report available hp.com/go/hpinkswitepaper

Learn more at
hp.com/go/OriginalHPinks

