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White Paper

How to Determine the Best Wide-Format Printing Technology for Your Company

Revised 2014

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Contents

<i>Introduction</i>	3
<i>Invest in the right technology for the job</i>	4
<i>The true cost of monochrome printing</i>	4
<i>The cost comparison</i>	6
<i>Total cost of ownership analysis</i>	8
<i>Why you should consider plotting in color</i>	9
<i>Color plotting - should you use ink or toner?</i>	9
<i>Comparing leasing versus purchasing</i>	10
<i>Information links</i>	11



Introduction

If you work in **AEC - architecture, engineering, or construction**, then you know the way you handle construction drawings has changed significantly over the years.

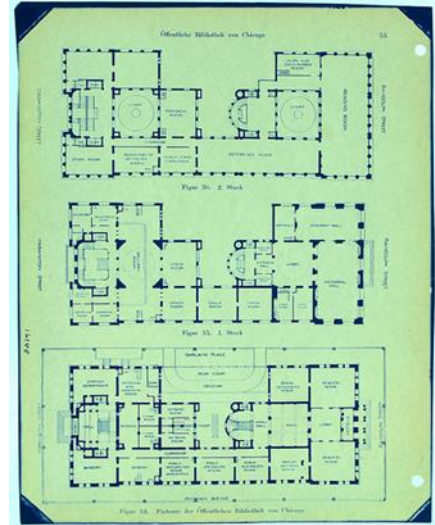
Traditionally, plans were printed and distributed by print shops to subcontractors for bid sets. Now, more and more, plans are shared as electronic files through email or online plan rooms.

Therefore, subcontractors need an efficient way to print their plans for themselves instead of relying on outside resources.

From here, AEC companies typically begin their search for a new wide-format system. *So, which technology makes the most sense, ink jet or toner?*

This white paper will analyze some data to determine which printing technology provides the most cost effective solution to meet your needs.

It is important to note that many of the wide-format systems available today are multifunction systems—printers bundled with onboard scanners. This article has been updated to reflect that change. This allows for a fair comparison between the two types of printing technologies that are the most sought after and used in AEC today.



Invest in the Right Technology for the Job

Before you can effectively determine what type of plotter would suit you best, you need to analyze all of your wide format requirements. Too often, buyers only have one criterion—to buy the least expensive plotter available. While this position is certainly understandable, it doesn't mean that it is the best business decision.

The truth is, sometimes when you purchase a plotter based on the lowest price, it can ultimately cost you more in the long run. Printers, small format and large format alike, are designed to function within a certain volume parameter. Once you exceed the limits of that parameter, the maintenance and usage costs will exceed the expense of a bigger system. Therefore careful analysis of your company's estimated print volume is crucial. If you expect to have mid-to-high volume needs, choosing the correct technology for the application is mandatory.

Durability is another factor to consider. Regardless of manufacturer, ink jet plotters are generally designed for a three year duty cycle. But, that is not necessarily a bad thing considering that the price of inkjet plotters have dropped significantly over the years. They are literally a fraction of the price they were even five years ago. So, in some cases, it makes sense to simply upgrade your hardware every three years. In this case, leasing can be a great option.

Toner-systems, on the other hand, are expected to last for many years. In fact, Océ systems tend to perform reliably for seven to ten years, typically. A solid platform like that could easily outlive two or three ink jet units. Plus, toner systems are much more capable of handling higher volumes and have faster outputs than their ink jet counterparts. There are instances where toner-based systems are used to print as much as 50,000 square feet per month.

The True Costs of Wide-Format Monochrome Printing

Ink Jet Plotters—this is the least expensive option regarding the initial hardware price, but they are dependent on ink and other consumables such as print heads and maintenance kits (cleaners). It is important to note that this dynamic is applicable to all inkjet products, such as the Canon imagePROGRAF series as sold by TAVCO as well as other brands.



If you consider all the usage elements (paper, ink, and print heads), the resulting cost for monochrome ink jet printing averages \$0.09 per square foot at 3,000 square feet per month. Expect this price to increase significantly for color output.



This is the figure that we will use in our comparison charts. (*Note: Service costs are not part of this metric.*)

How the \$0.09 cost per square foot was calculated:

- \$0.043—Cost of ink per square foot
- \$0.034—Cost of 20-pound ink jet paper per square foot
- \$0.013—Cost of ink jet print head per square foot
- \$0.002—Cost of maintenance cassette per square foot
- \$0.092—Total cost per square foot

LED Toner Plotters—these units are more expensive than similar ink jet units, but under the right conditions, they can easily justify the difference through speed and productivity. Again, this is a baseline cost for units utilizing this type of technology, such as Océ Wide-Format Printing Systems.

If you consider all the usage elements (paper, toner, developer, and service), the resulting cost for monochrome toner printing averages \$0.11 per square foot at 3,000 square feet per month.



This is the figure that we will use in our comparison charts. (*Note: Service costs are part of this unit cost because of the structure of the all inclusive service contracts.*)

How the \$0.11 cost per square foot was calculated:

- Based on TAVCO's proprietary all-inclusive service plan, the total cost of operation is calculated at \$0.11 per square foot at 3,000 feet per month.
- Interestingly, the cost per foot drops as volume increases. For instance at 6,000 square feet per month the cost drops to \$0.095 per square foot.
- At 10,000 square feet per month, the operational cost is \$0.089 per square foot.

The Cost Comparison

This wide-format analysis is based on the comparison of a [Canon iPF825 MFP](#) and an [Océ PlotWave 340 printer](#). Both of which are configured as two roll systems complete with scanner and system controller.

Both units are sold and supported by TAVCO Services, Inc.

The Short Term (3 years)

Inkjet Technology		Toner LED Technology	
Hardware costs to acquire equipment			
Cost of MFP (printer and scanner)	\$11,495.00	Cost of MFP (printer and scanner)	\$23,520.00
Cost of extended warranty (3 years)	\$3,445.00	Cost of extended warranty	\$0.00
Usage costs - paper and other consumables			
Printing costs per square foot	\$0.09	Printing cost per square foot	\$0.11
<i>*average costs for paper, ink, and printheads (No service)</i>		<i>*average costs for service, toner, & paper via TAVCO All-in-One Plan</i>	
Total costs of operation - includes equipment and supplies			
Total print cost per month	\$276.00	Total print cost per month	\$327.00
Total operational print cost per year	\$3,312.00	Total operational print cost per year	\$3,924.00
Total cost of ownership over 3 years	\$24,876.00	Total cost of ownership over 3 years	\$35,292.00
<p><i>This is a true "apples to apples" cost comparison between ink jet and toner based printing technologies. For this comparison, a Canon iPF825 MFP System is set against an Océ Plotwave 340. Both are configured as a 2-roll MFP with printer, scanner, and system controller. The print demand is based on an average baseline of 25 plots per day (3,000 square feet per month). The price level used for both units is shown at MSRP value. If the actual street price of each unit is less, the differences between the two should remain consistent with this comparison.</i></p>			

Results: The total expenditure for the ink jet machine, including hardware, service, and supplies, is lower than the toner-based unit. But, this is the end of the expected life of the ink jet.



The Long Term (6 years)

Inkjet Technology		Toner LED Technology	
Hardware costs to acquire equipment			
Cost of MFP (printer and scanner)	\$11,495.00	Cost of MFP (printer and scanner)	\$23,520.00
Cost of extended warranty (3 years)	\$3,445.00	Cost of extended warranty	\$0.00
Cost of replacement MFP	\$11,495.00	***No upgrade needed	\$0.00
Cost of extended warranty (3 years)	\$3,445.00	***No upgrade needed	\$0.00
Usage costs - paper and other consumables			
Printing costs per square foot	\$0.092	Printing cost per square foot	\$0.095
*average costs for paper, ink, and printheads (No service)		*average costs for service, toner, & paper via TAVCO All-in-One Plan	
Total costs of operation - includes equipment and supplies			
Total print cost per month	\$276.00	Total print cost per month	\$285.00
Total operational print cost per year	\$3,312.00	Total operational print cost per year	\$3,420.00
Total cost of ownership over 6 years	\$49,752.00	Total cost of ownership over 6 years	\$44,040.00

This is a true "apples to apples" cost comparison between ink jet and toner based printing technologies. For this comparison, a Canon iPF825 MFP System is set against an Oce Plotwave 340. Both are configured as a 2-roll MFP with printer, scanner, and system controller. The print demand is based on an average baseline of 25 plots per day (3,000 square feet per month). The price level used for both units is shown at MSRP value. If the actual street price of each unit is less, the differences between the two should remain consistent with this comparison.

Results: Although the initial cost of the toner machine is higher, over time it actually costs less money to use. The limited durability of the ink jet system has a large impact on this. Again, it is typical for ink jet plotters and MFPs to be replaced every three to four years.

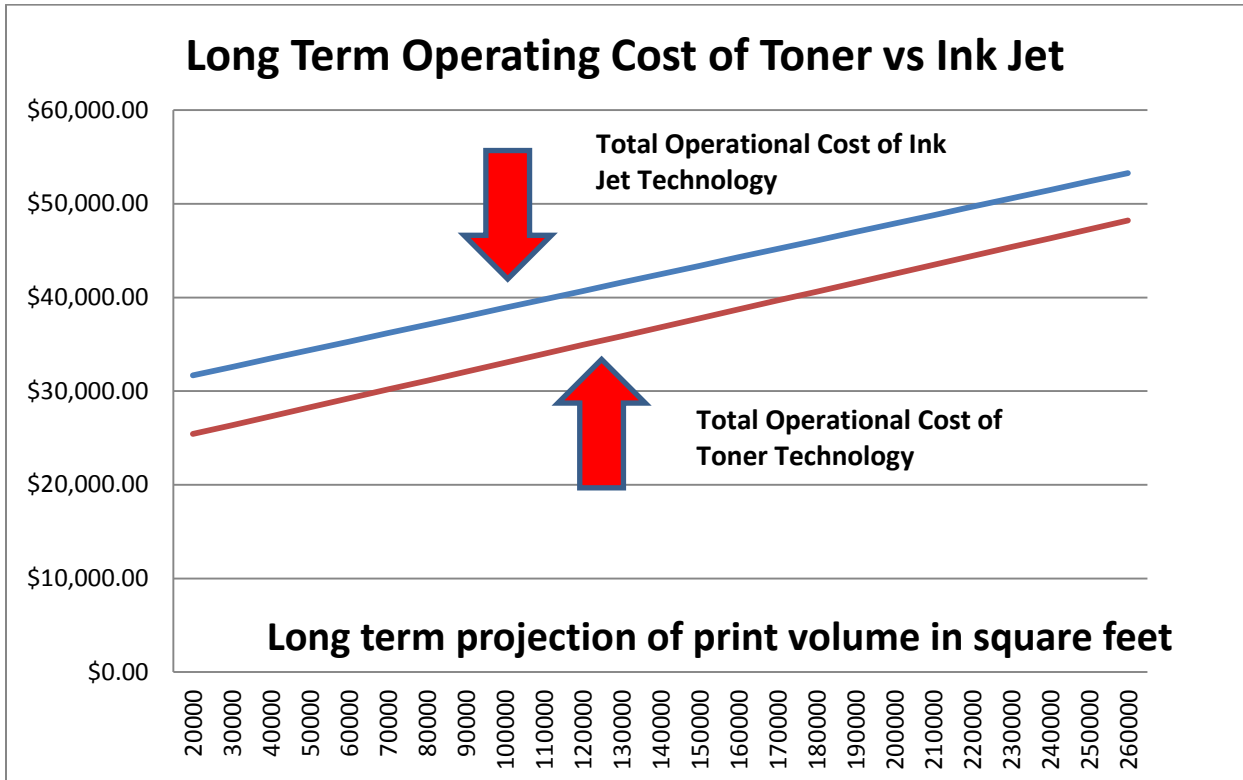
As a result, the toner system saves the company more than \$5,700 over six year period. Another important thing to point out is that as the print volume increases, the square foot cost of operation of the toner system decreases.

Likewise, overall functionality and end-user experience cannot be quantified in this analysis. Examples of enhanced functionality include, but are not limited to, efficient paper stacking, single-touch operation, mapped scan destinations, etc.

These intangible factors matter and can have a huge impact on a company's productivity and should be considered.



Analysis – Long Term Cost of Operation of Ink Jet and Toner Plotters



****The X-Axis of the scale reflects the total number of square feet printed over the lifetime of the product. Since this is a long-term projection, the assumption of upgrading the ink jet system after 3 years is considered and calculated in this data.***

Findings

After reviewing the total operating costs between the two printing technologies, it is evident that the total cost of ownership is relatively close over the long term. Since this is a long-term projection, the assumption has been made that the ink jet MFP will have to be replaced after three years. This variable increases the investment of the ink jet unit almost \$15,000 over the long term because of having to replace the unit and purchase another extended warranty.

However, that is not the whole picture. There is still a case to be made for toner MFPs. There are two specific factors that you need to examine thoroughly before investing in a new wide-format system—throughput and end-user experience. If speed is a concern, ***toner is still faster, up to 900% faster in some cases.*** If your company has multiple users, needs to print consistently, or has occasional large runs, then a toner-based system may be better solution.

Plotting in Color – A Growing Need

Traditionally, CAD and construction drawings have been 2D monochrome images. If your company still relies on those types of drawings, then a monochrome printer may work just fine for you.

However, advancements in technology are redefining the way firms approach the design-build process. **BIM (Building Information Management)** is a concept that is changing the way people work in AEC. With BIM, the entire project can be built virtually from beginning to end. It can be described as a virtual 5D model of the construction project. That is the three standard spatial dimensions, plus time as the fourth dimension and cost as the fifth.

With all this new data injected into the workflow, color printing is becoming vital for better communication. So, if you are involved in BIM or soon to be, you should consider some type of color device, even if it is a low volume, supplemental unit.

Color Plotting – Is Color Toner Right for You?

If your company's workflow requires a high level of color output, there is another option to consider besides ink jet plotters and MFPs. Color toner systems are now available for more productive environments. One example of this new type of technology is the [Océ ColorWave 650](#) – *TonerPearl Printer with CrystalPoint Technology*.

Although color toner hardware is much more expensive than ink jet systems, they present some very unique advantages over traditional ink jet printers:

- Faster print speeds
- More powerful PC controllers for faster file processing – this has a significant value for companies who print large, complex files such as BIM or GIS
- Larger media capacity – the *ColorWave 650* is capable of a six roll configuration giving you a potential media capacity of 9,000 square feet
- Better stacking and organization of printed sheets
- Better Operation in a shared or centralized environment

(Note: A color toner plotter can easily replace the workload of two or more inkjet printers. This will result in an immediate operational cost savings from not having to stock multiple sets of ink, print heads, and print media.)

Wide-Format Plotter Acquisition – Purchase versus Lease

Budgeting

Many businesses earn revenue over time - to pay as you use makes sense: Why pay out in one lump sum when with leasing you can make small fixed manageable payments? It equates to pay as you use. Payments made throughout a lease arrangement are unaffected by changes in interest rates; you can therefore accurately plan for lease payments in advance. And as cash flow can be forecast, cost of use can be compared with projected revenue and profits generated by the use of the plotter and/or wide-format scanner.

Tax efficiency

Leasing can reduce your overall tax bill, as the cost is deductible as a business expense reducing the net cost of leasing the equipment. This factor will help determine whether to rent or lease, rather than buy. If you lease you do not have to pay the cost of the plotter immediately and you may reclaim everything you pay out on a 'by payment' basis - monthly, quarterly or annually.

Upgrading technology

It is well accepted that a plotter or wide-format MFP system is not a business asset that appreciates: This type of technology depreciates faster than the vast majority of purchased assets. So save purchases for assets that either appreciate or depreciate less. Leasing gives more freedom for up to date office equipment, important with printers and copiers, to be installed as required, less affected by budget restraints. Large format printer leasing improves cash flow and creates a hedge against inflation, depreciation and obsolescence. Importantly, it allows you to take advantage of technology improvement at a time of your choosing and at a reasonable cost. By contrast, a business that owns its office equipment can only upgrade by reinvesting and disposing of the existing asset. A wide printer lease with TAVCO will include provisions to trade up to a newer model or, when necessary, to one that accommodates the higher volume, speed and features your business requires at the right time, giving you freedom to upgrade without buying new.

Multifunctional

Because the latest wide-format systems are multifunctional i.e. they combine all the functions of a plotter, scanner, and wide-format copier, it makes sense to be able to upgrade all these products and facilities at the same time rather than having to deal with multiple outdated machinery. This is one of the newer benefits of leasing combined with the latest multifunctional systems.

Capital

It makes sense to use capital for expansion or appreciating business purchases. Leasing for office technology preserves precious resources for these purposes and other business opportunities. Furthermore, you are able to preserve your existing bank lines and optimise your use of commercial credit sources.

Flexible payment

You can choose the option that makes for the most comfortable leasing arrangement, normally up to 5 years, giving immediate access to the printing equipment you need, the necessary speed, and the right multifunctional technology, via payments your business can handle and without the large deposit normally associated with outright purchase.

Return on investment (ROI)

Let the new equipment provide you with a return ... The reason for a new wide-format system is to increase productivity; with leasing you are in the position to use the cost saving and increased production ROI to make the periodic payments.

Buying tips for a wide-format system lease

- **Get a demo:** When deciding between two or three plotter models, ask for a demonstration of how the machines work. At the very least, watch a demonstration video and get some sample prints.
- **When not to:** If you expect to print fewer than 75 D-size (24"x36") sheets per month, you probably do not need to lease a plotter. You would be better off outsourcing your work to a reprographics shop unless you find value in the convenience of having one onhand.

Who retains the equipment at the end of the plotter lease?

Title to the goods remains with the finance provider, which means the equipment does not show on your company balance sheets and therefore not applicable to the expected value depreciation over a fixed period. This of course gives you the advantage of staying in touch with the latest technology by changing your equipment towards the end of your lease.

Can we upgrade before the wide-format printer lease agreement expires?

Yes. An equipment leasing organization allows businesses to keep up with changes in technology as your original installation can be altered either during or at the end of your lease period. The normal reason for this is due to a customer's expansion of business and their changing needs.

Why should I choose large format equipment leasing?

All sectors of the US economy take advantage of business equipment leasing; it is the most popular choice for small businesses that need a mid-to-high volume plotter or multifunction system just as a large multi-national organizations prefers to keep a tighter control on their finances and enjoy the tax efficiency and upgrade opportunities of a lease agreement over purchasing.

How does plotter leasing work in practice?

Leasing is a contract between a finance company and a customer, giving the customer use of the equipment on payments of rentals over a period. When you lease equipment you make a series of regular (usually monthly) payments, instead of a large capital outlay.

Why lease a wide-format machine rather than purchase?

The cash flow and tax relief benefits of leasing provide a very strong case against cash purchase. If you buy equipment outright the capital invested becomes, in effect, tied up in a depreciating asset. Plotter leasing on the other hand allows you to save resources for other purposes or opportunities. *To be sure of the right decision for your business specifically, speak to your accountant who can advise upon what is best for your company financially.*

Summary

The analytics show that it is crucial to do the proper planning and to accurately forecast your print volume needs. Simply looking for the least expensive solution can sometimes leave you paying more in the end—much more! Here are some key takeaways:

- **Operating costs for ink jet plotters average \$0.09 per square foot (2D CAD line prints) but these units are slower and are consumable intensive**
- **Operating costs for LED toner plotters average \$0.11 per square foot at lower volumes, but drop to around \$0.09 at mid-volume levels**
- **Color toner plotters cost about \$0.15 per square to operate, but they are incredibly powerful systems that can replace the workload of multiple ink jets**
- **Ink jet plotters and MFPs are a great choice for entry level systems**
- **Toner plotters (monochrome and color) are much faster than their ink jet counterparts**
- **Toner plotters are much more durable than ink jets**

For more information on wide-format technology solutions,

[Contact a TAVCO Wide-Format Advisor](#)

[Information on Océ Wide Format Systems](#)

[Information on Canon iPF Color Ink Jet Plotters and MFPs](#)

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