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Printers - Always the Bridesmaids - Never the Bride

When it comes to specifying computer equipment, printers are usually the bridesmaids - never the bride. Printers are often the annoying peripheral tacked on to the end of the network. Do these attitudes stand up under closer scrutiny? Consider the following:

- Over it's life, a printer in a typical office situation will cost far more in consumable/maintenance costs than the original purchase price. A large work group printer could easily cost more than $5000 per year in toner and maintenance costs alone.
- Apart from printer toners/maintenance costs, there are often very high 'hidden' costs related to time, paper, maintenance and power usage.
- When a printer goes down, more often than not, many people are affected - making printing resources a critical part of any organisation's workflow.

In spite of the above, it is not uncommon for organisations to spend proportionately more on individual workstations than on printers.

Printers are an expensive and critical part of any organisation's workflow. A printer's purchase and implementation deserves close scrutiny.

White Paper - Aims

This White Paper proposes 14 ways to reduce print costs - not only are techniques for consumable cost reduction considered, but 'hidden costs' such as paper, time and power use also scrutinised to suggest cost economies.

Each cost saving suggestion can be taken in isolation, but using a combination of the cost saving suggestions can leverage real synergies.

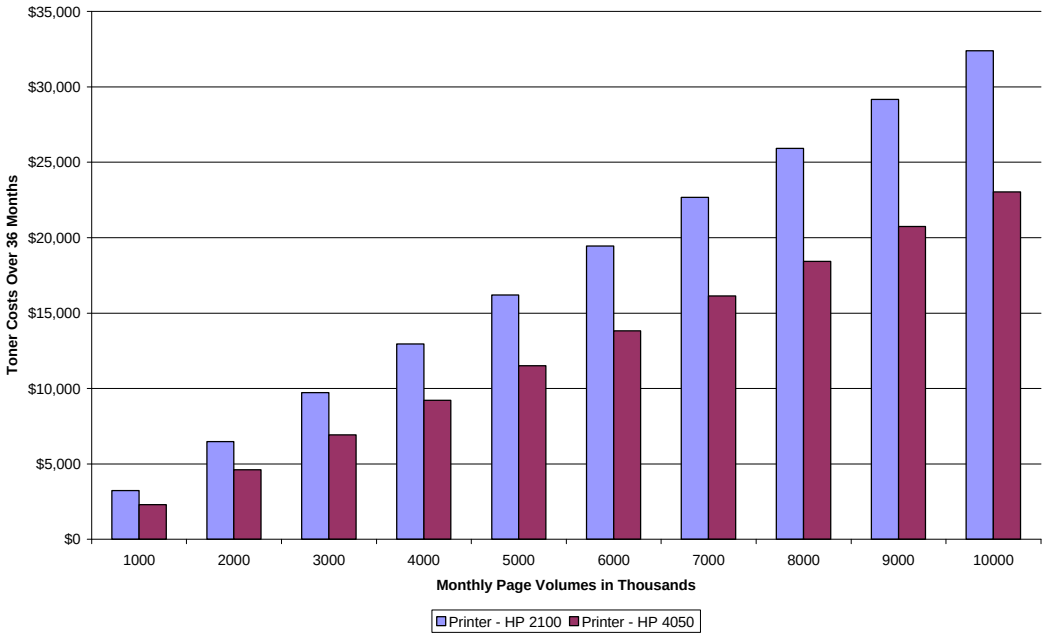
The 'best method' approach to producing cost savings is to carry out a comprehensive analysis of an organisation's printing needs. Such an analysis must cover the following areas to be effective:

- Who currently prints what, where and in what volume?
- What current printing resources are available and how are they used?
- What costs are currently incurred for printing?
- What are the likely future printing needs?

This type of survey is best carried out by specialist consultants - independent of any printer or copier brand. IPR has the most in-depth expertise available in the New Zealand market. Please refer to our profile at the end of this document.

Specifying the Right-Sized Printer for the Job

For situations where reasonable monthly volumes will be printed, using a medium-large workgroup printer may incur lower toner costs than using a small work group printer - consider the example below.



Conclusions:

Printing with the more expensive printer - the 16 ppm HP LJ 4050 clearly shows a cost advantage at any volume over the less expensive 10 ppm HP LJ 2100. The extra capital cost of the LJ 4050 over the cheaper printer is paid for in 18 months with print volumes of 5000 pages per month (2.5 reams of paper per week) calculated in toner savings alone. Other additional benefits from using faster printers include lower maintenance costs and fewer user interventions.

Summary:

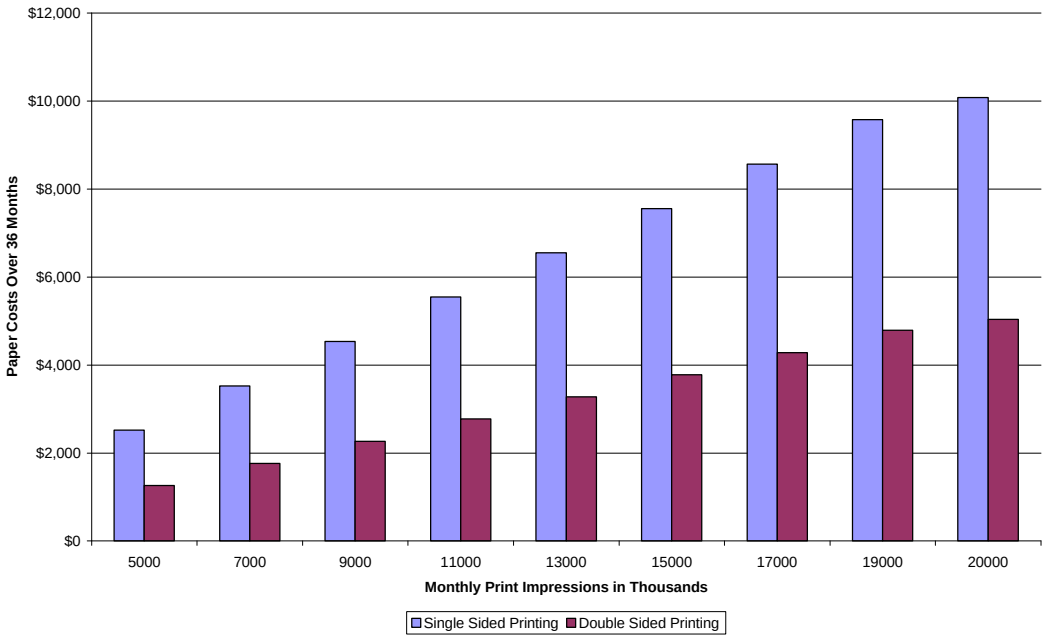
Just as it is important to avoid purchasing printers that are too large, it can be equally costly to under-specify a printer. To make the right decision it is important to know:

a) expected monthly print volumes
b) the page cost of printers (ie: what is the consumable cost to print each page).

Assumptions used: graph shows toner cost only, A4 page coverage at 10%, and RRP pricing used for consumables

The Advantages of Double-Sided Printing ('Duplexing')

A duplexer is an accessory device that can be installed in most mono printers with speeds of 12 ppm and greater. With a duplexer, both sides of the page can be printed, giving savings in paper costs and storage space costs. The graph below illustrates the paper cost saving that duplexers can generate:



Conclusions:

As page volumes mount, the graph clearly shows how duplexing can halve paper costs. At 15000 impressions, for example, a total paper cost saving of $3780 can be made over 36 months. Looked at in another way, the capital cost of a duplexer can be paid off in less than 12 months.

Summary:

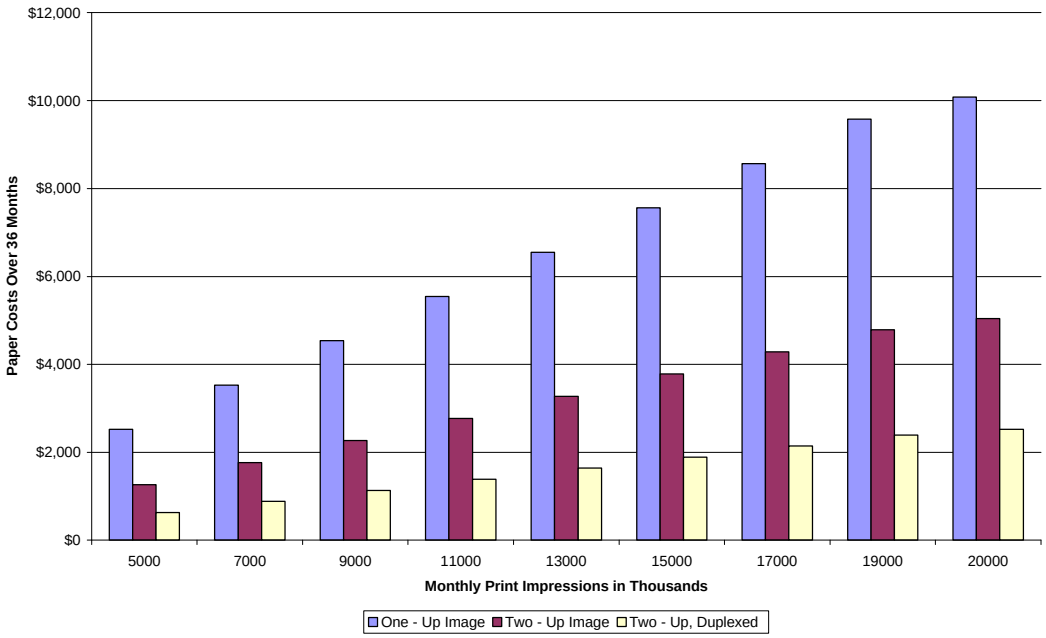
Installing a duplexer for even moderate print volumes can be worthwhile. The benefits don't end with reduced paper costs, however - duplexers also generate lower costs through the reduction in printed paper bulk. This saves on storage costs, and is environmentally beneficial.

Not all printed hard copy should be duplexed. It is worthwhile, however, to analyse what hard copy output could benefit from this process.

Assumptions: paper cost is $0.014 per leaf

'Two-Up' Printing

Modern printer drivers allow more than one image to be printed on a page. With a 'two-up' printing option enabled, 2 x A4 pages will be printed on one A4 page - each image effectively condensed down to an A5 size. Two-up printing is an effective way to save paper costs. The following graph shows the savings to be made:



Conclusions:

Printing two-up produces the same paper savings as duplexing. If two-up printing is combined with duplexing, paper saving costs can be significant. For example, with 15000 impressions being printed each month, the savings in paper costs will be $5670 over 36 months. Even further savings can be achieved by printing 'four-up' - four impressions on each A4 leaf.

Summary:

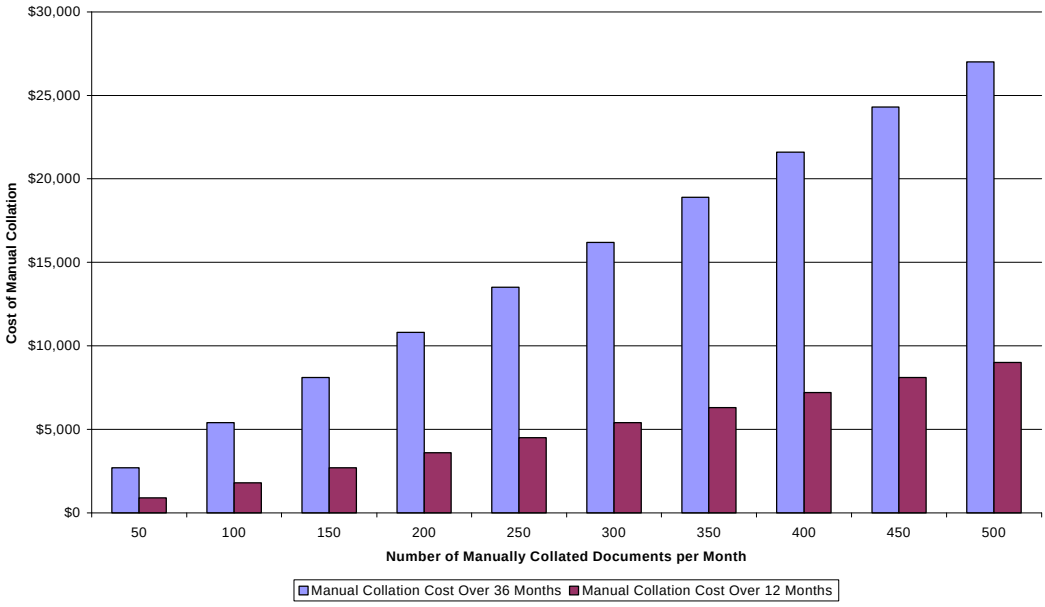
Like duplexing, printing two-up (or four-up) is only applicable to certain types of printing requirements - typically archived reports. Two-up printing not only saves on paper costs, but also reduces storage costs.

It is a worthwhile exercise to analyse what hard-copy output could benefit from re-formatting into a two-up printing process.

Assumptions: paper cost is $0.014 per leaf

Printer Collation

When printing a large number of multi-page documents, a substantial amount of time can be spent manually collating the printed pages (assembling the pages in the correct order). The reason for this is simple - many printers cannot print the pages of a multi-page document in order ('collation') - the finished hard copy from the printer may be 10 pages of page 1, 10 pages of page 2, etc. Using a printer with on-board collation capability means that the reports can be printed in page order - saving the time required to manually carry out this task. The following graph illustrates the savings that can be gained by using a printer with collation capability:



Conclusions:

Printing 100 copies of a 40 page report each month using manual collation incurs a labour cost of $1800 over 12 months and $5400 over 36 months. The capital expenditure required to upgrade a printer for on-board collation capability is around $1000 or less - giving a payback on the upgrade of just over 6 months.

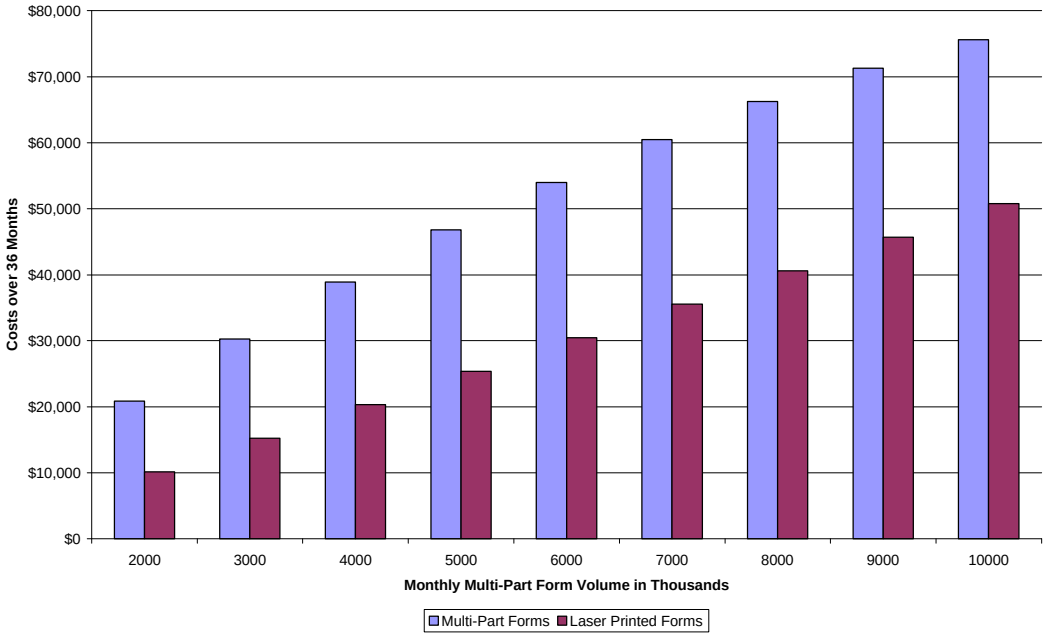
Summary:

For organisations with a high demand for multi-page documents, dispensing with manual collation of pages and installing printers with collation capabilities produces a very quick financial payback. Traditionally, larger office workflow patterns have used copiers to copy, print and collate multi-page documents (using hard copy originals generated on printers). Switching this workflow to printers gives the following advantages: better print quality and improved productivity through a reduction in workflow steps. Switching print flows from copiers to printers also reduces the need for large, expensive copiers - producing overall savings on lease costs.

Assumptions: time taken to manually collate a 40 page document is 2 minutes. Labour costs (charge out rates, or opportunity cost of employed labour) are calculated as $45.00 per hour, based on a wage rate of $15.00 per hour.

Replacing Multi-Part Forms

Many organisations use pre-printed multi-part forms - usually for printing combined invoices/shipping documents. If the work flow process is re-engineered to allow the printing of documents on laser printers (this will require specialist forms software), significant cost benefits can be obtained, as can be seen from the following graph:



Conclusions:

The graph shows that replacing 5000 multi-part forms per month by hard copy produced on a laser printer/s will introduce a total cost saving of $21000 over 3 years.

Summary:

There is compelling cost evidence to suggest the organisations who use substantial volumes of multi-part forms should consider re-engineering their work flows to use laser printed forms.

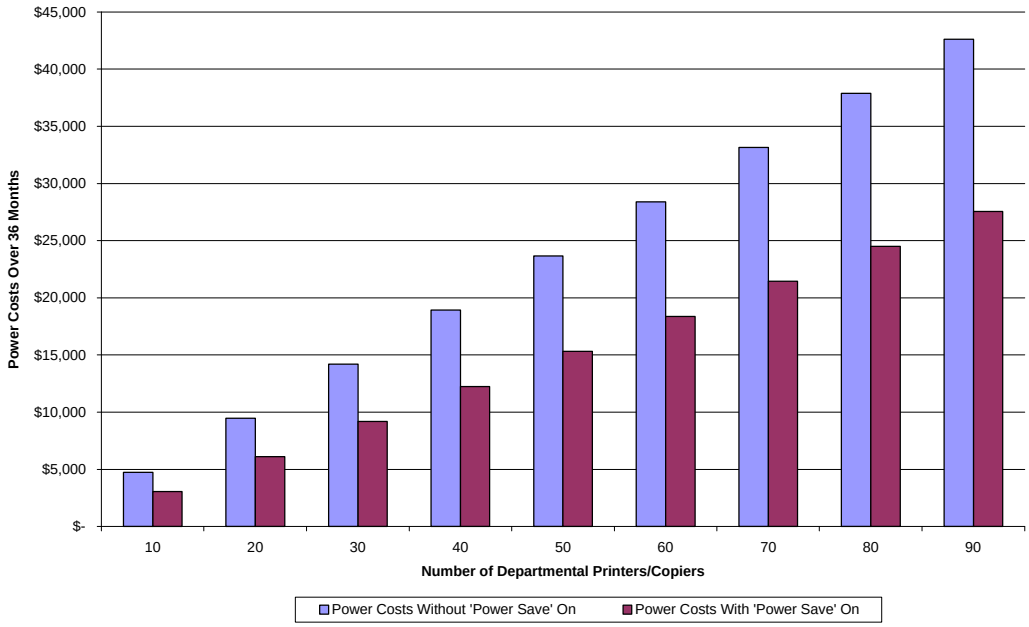
Stationery costs are only part of the cost saving picture. Laser printing invoices allows the following additional benefits:

- Very fast changes to form design without incurring the cost and time overheads associated with producing new film and plates
- Laser printed forms are much clearer than impact printed forms, reducing error rates
- Laser printers can be switched to other tasks, when not printing forms, unlike impact printers

Assumptions: the cost of 3-part forms plus print ribbons ranges from $0.29 cents to $0.21 for volumes priced. Laser production assumes replacement of the 3 part form with 3 x A4 sheets, printed with 7% coverage. The cost of toner per laser printed sheet is $0.3.3 cents per A4 sheet. Cost of paper used is $0.14 per A4 sheet.

Reducing Power Costs

Laser printers consume power - the most while printing, about a 1/4 of this while sitting idle and around a tenth in a 'power save' mode. The 'power save' mode can usually be configured to activate after a printer has sat idle for a pre-determined number of hours. The graph below demonstrates the power cost savings to be made by activating the 'power save' command - typically at night when there is no printing load on the printer:



Conclusions:

For larger organisations just making sure that the 'power save' mode is activated in all printers can make considerable power savings. A site with 20 printers will save $1000 per year by this method compared with leaving the printers in 'idle mode'.

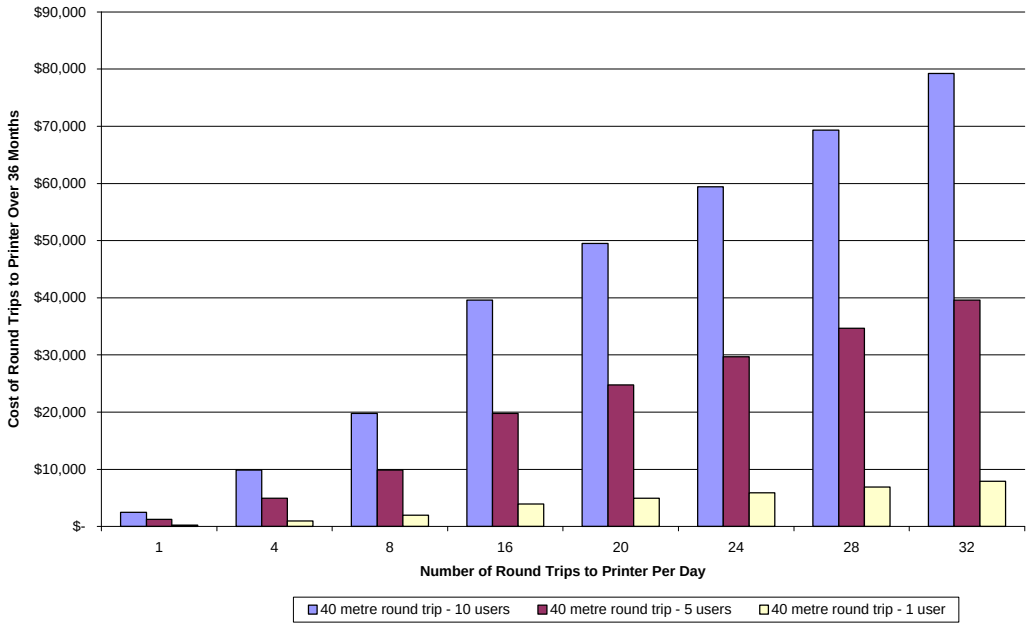
Summary:

Re-configuring printers from their front panels to can achieve significant printer power consumption savings. This can be quickly and easily achieved by non-technical personnel. The larger the organisation, the larger the saving s become. Additional power savings can also be made by ensuring other hard copy devices such as faxes and copiers (which have high power requirements) are also configured to take advantage of 'power save' settings.

Assumptions: power costs are $.010 per Kw/hour. Power consumption is calculated on a Hewlett Packard 8000 mono laser printer with the following power requirements - 550 watts while printing, 150 watts while idle qnd 41 watts while in 'power saving' mode. The 'sleep mode' model assumes that each printer will be printing for 3 hours per day, will stand idle for 7 hours per day, and will power down to 'sleep mode' for 14 hours per day. Workdays and non-workdays are factored into printer power use.

Printer Proximity to Users

The placement or proximity of a printer to regular users can incur high 'hidden' costs - depending on the distance concerned. These costs are shown in the graph below:



Conclusions:

Five users walking 20 metres to a printer 16 times a day will cost $19800 in lost time over 3 years. If the printer was brought 10 metres closer to the users this figure would be halved.

Summary:

The greater the distance a printer is situated from users, the greater the productivity loss. The above analysis indicates that siting small work group printers in close proximity to users may be a preferable strategy to placing large departmental printers at long distances from users.

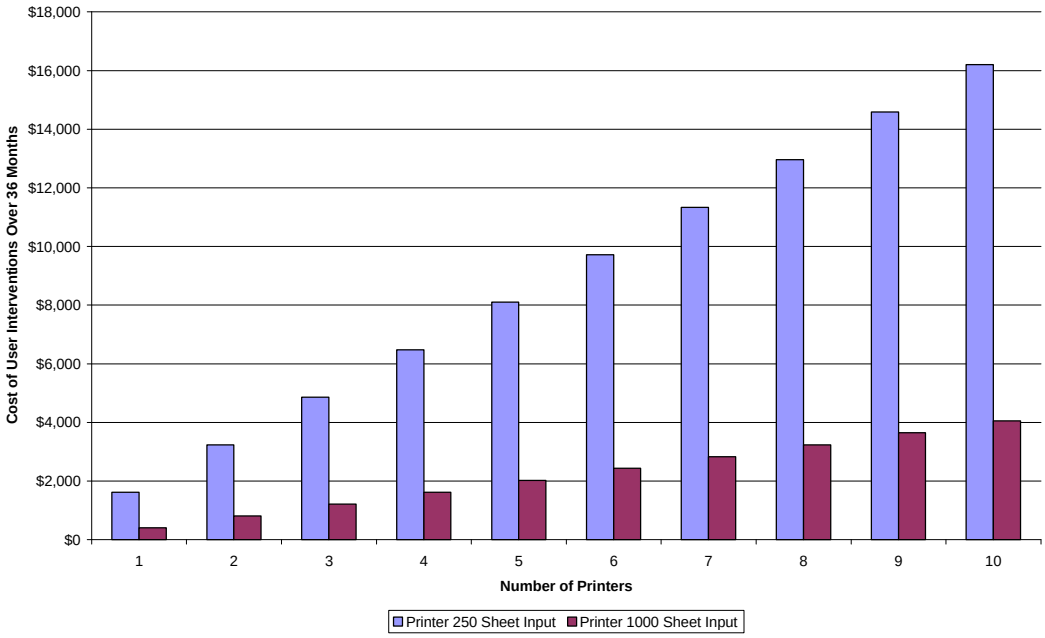
Larger departmental printers sited away from users should be reserved for the jobs they do best - clearing large print runs that would otherwise tie up smaller printers. If large departmental printers are used to handle small, individual print runs, a multi-bin mailbox should be installed to allow fast retrieval of print output.

The analysis does not take into account further productivity losses incurred when users interact socially en route to pick up their print jobs.

Assumptions: the average user will walk at 1.33 metres per second. Labour costs (charge out rates, or opportunity cost of employed labour) are calculated as $45.00 per hour, based on a wage rate of $15.00 per hour.

The Cost of 'User Interventions'

One simple way of looking at the cost of 'user interventions' would be to value the time it takes to refill a printer's paper cassette/s. The larger the paper capacity of a printer, the fewer the number of 'user interventions' required to undertake this task. The potential cost of additional user interventions is shown in the graph below:



Conclusions:

The graph compares the cost of user interventions for printers with 250 sheet input capacity and those with a 1000 sheet input capacity. Assuming an organisation has 5 printers, specifying printers with 1000 sheet input capacities will save $6000 in user intervention costs over 36 months compared to specifying printers with only 250 sheet capacity. Assuming the cost of upgrading the paper capacities of each printer is $600, the net savings over 36 months still amount to $2400.

Summary:

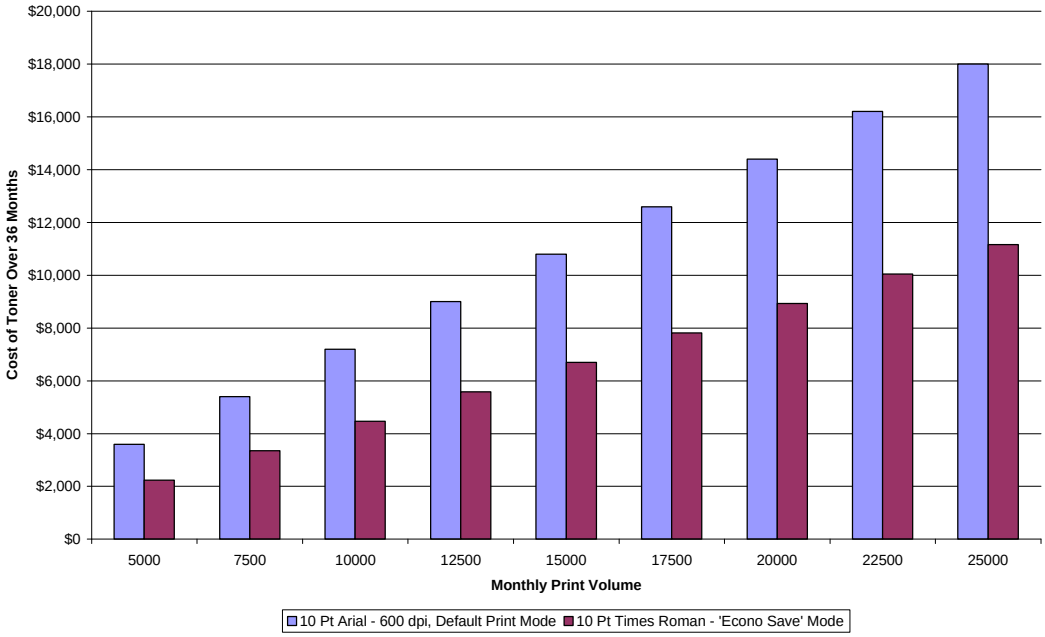
The evidence suggests that small, but worthwhile productivity savings can be made by equipping printers with the appropriate paper handling accessories.

The study above only calculates potential cost savings for paper input - similar savings can also be made on the paper output side: eg: large capacity output bins can allow overnight unattended printing. Specifying printers that require less frequent consumable replacements can also make further productivity savings.

Assumptions: each user intervention is estimated to take on average 3 minutes - the time required to refill a paper cassette/s. With a labour charge-out rate of $45 per hour, the opportunity cost for each user intervention is $2.25. It is assumed that each printer will print 5000 sheets per month.

Change Your Font and Reduce Costs

Your choice of fonts will have a cost impact. For example, using a serifed font such as Times Roman, will use less toner than a non-serifed font such as Arial - for the same number of characters and at the same point size. At lower print volumes, the potential extra cost of using one particular font over another may offer benefits that outweigh toner savings - such as better impact and legibility. However, for many higher-volume print tasks, font 'aesthetics' are not so important - eg: end-of-day sales reports, or reports that must be archived for legal reasons. The graphed example below shows the savings to be made when printing higher volumes if the font type is changed and the printer is set to a toner saving mode:



Conclusions:

At 15,000 copies per month, re-engineering the font type from 10pt Arial, to 10pt Times Roman in 'Toner Saving' mode, will save $4000 over 36 months.

Summary:

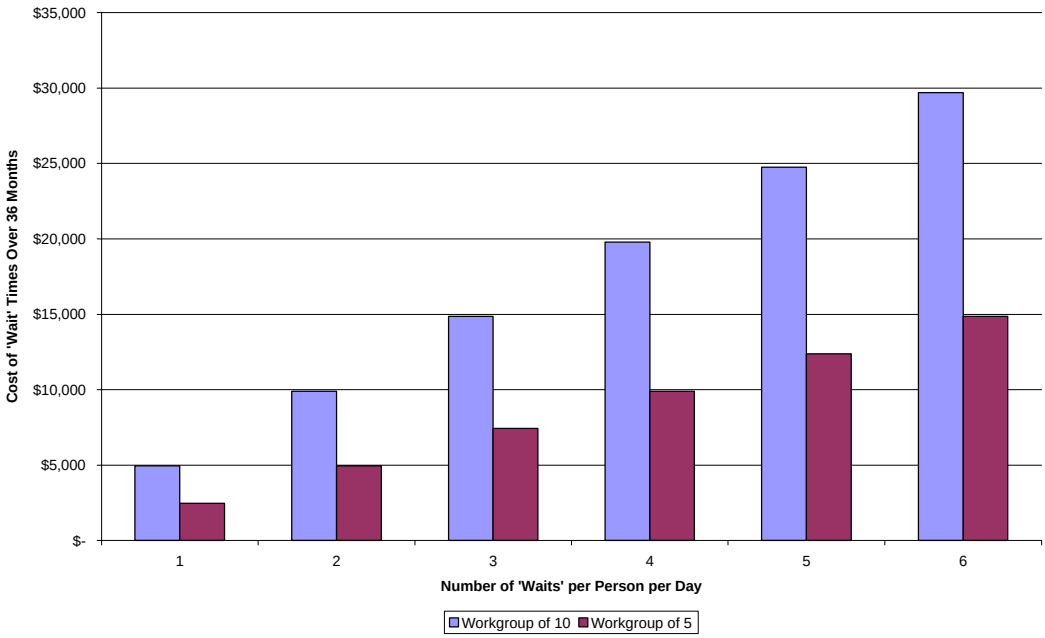
Large savings in toner costs can be made if careful thought is given to font selection and printer driver settings that control print density. The higher the printed page volumes, the more significant the savings.

Reducing hard copy quality will not be appropriate for many documents that are sent outside an organisation. However, many organisations could take advantage of the cost savings available where documents are intended for in-house use only, or even where documents printed for public consumption have an expectation of lower printer quality - such as sales invoices.

Assumptions: toner price based on 'street price' for a HP LaserJet 8000. Cartridge yields based on manufacturer's printed specifications. Comparative toner yields calculated using 'Pagecheck' software on an IPR test target.

Waiting for a Printer? It Costs!

Because a printer is an expensive capital item, there is often a temptation to increase the ratio of users to available printers. This saves on capital purchase costs, but can invoke dramatic 'hidden costs' when users have to wait for their hard copy output. The graph below illustrates why:



Conclusions:

For a printer serving a 5 person workgroup, the cost for each workgroup member waiting 3 times per day for printing is $7425 over 36 months - the capital purchase price of 2 mid-sized (16 ppm) work group printers. The cost implication for 10 member workgroups with the same number of wait times is double this figure.

Summary:

The cost of making users wait for their hard copy output can be very high - in many cases much higher than the capital cost of simply adding more printer resource.

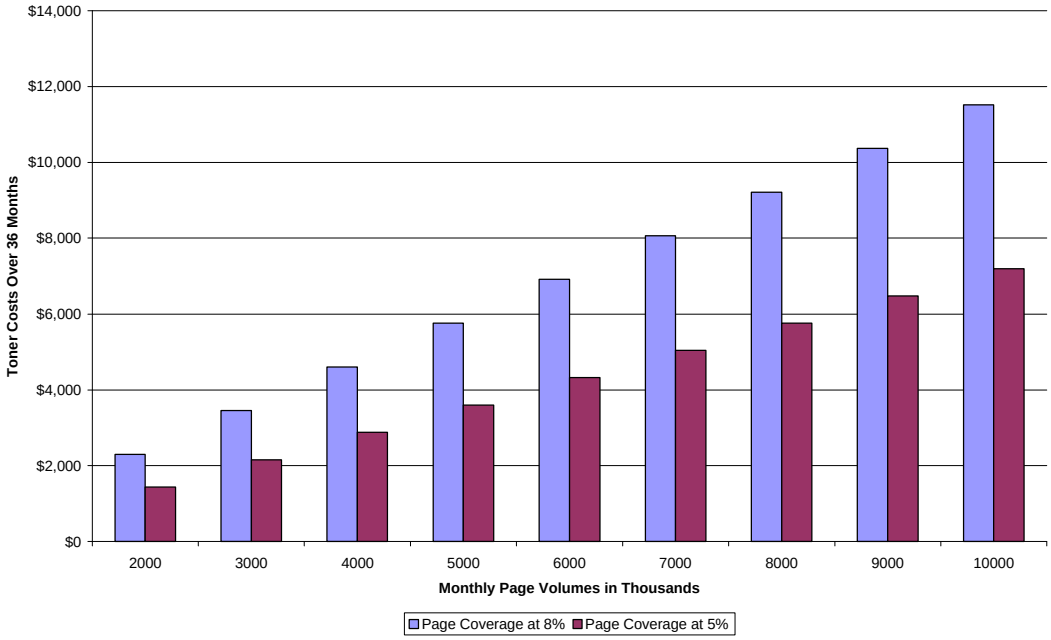
Effective strategies to reduce wait times include:

- Encourage users who generate lengthy print runs to print after hours
- Provide alternative/additional printers on the network to reduce the frustration of 'wait' times
- Separate print functions by type and maximise available printer resources - eg: route multi-copy runs to high speed printers while sending single page 'I want it now' printing to more localised printers.

Assumptions: each user 'wait' is estimated to take on average 3 minutes. With a labour charge-out rate of $45 per hour, the opportunity cost for each user 'wait' is $2.25.

Reduce Toner Coverage and Save

With modern word processing and page lay-up programs, it's not hard to add considerable embellishment to any page design - a border here, some bolding there. However, considerable savings in toner consumption can be made if design features are only used where they assist in communicating information. 'Economical' design that reduces toner consumption is particularly important for high volume documents such as forms. The cost consequences of designs that use different page coverage rates are graphed below:



Conclusions:

At 6000 copies per month, increasing toner coverage by 3% costs $2500 over 36 months. For higher volumes, the costs can be considerable if extra coverage is used - at 15000 pages printed per month, adding another 3% toner coverage costs $6480 over a 36 month period.

Summary:

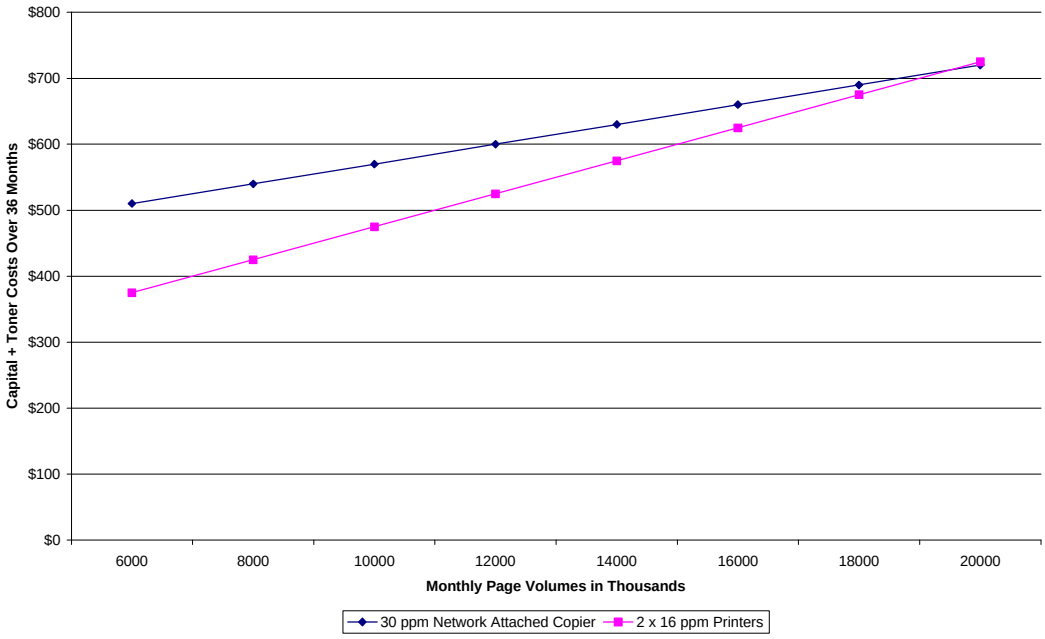
Organisational documents are designed to carry out a purpose - therefore, every facet of the document's design should assist in communicating this purpose. 'Unnecessary' design elements that use additional toner add to the cost of document production with no additional communication benefits.

Note: colour printers are particularly sensitive cost wise to toner coverage. If economy is an issue, users should avoid using large areas of saturated colours. Blue backgrounds (often seen in MS PowerPoint) are particularly heavy on toner as they use high percentage areas of magenta and cyan toners. For maximum impact at lowest print costs, employ the principle that 'white space' best defines page content - rather than large areas of colour fills.

Assumptions: toner price based on 'street price' for a HP LaserJet 8000. Cartridge yields based on manufacturer's printed specifications.

Is Bigger Better?

Larger printers are often bought on the premise that they have much lower 'running costs' than smaller printers. This assumption is typically based on the cost of consumables, or the 'click charge', and often ignores other important cost overheads such as depreciation. A high cost printer must be run at high volume when compared with less expensive printers in order to benefit from lower consumable costs. The graph below shows the point where it pays to buy a more expensive printing solution (and the converse):



Conclusions:

Both the printing solutions graphed give a 30 ppm + output - however, the printing option uses two 16 ppm laser printers. The capital cost of the two printers is lower than the copier, but the toner costs are higher. It is not until nearly 20,000 pages that the copier achieves cost parity and becomes the cheaper option. If the more expensive copier is purchased, and the monthly number of pages printer only averages 10,000, then that purchase decision carries a penalty cost (compared with the printer option) of $3420 over 36 months.

Summary:

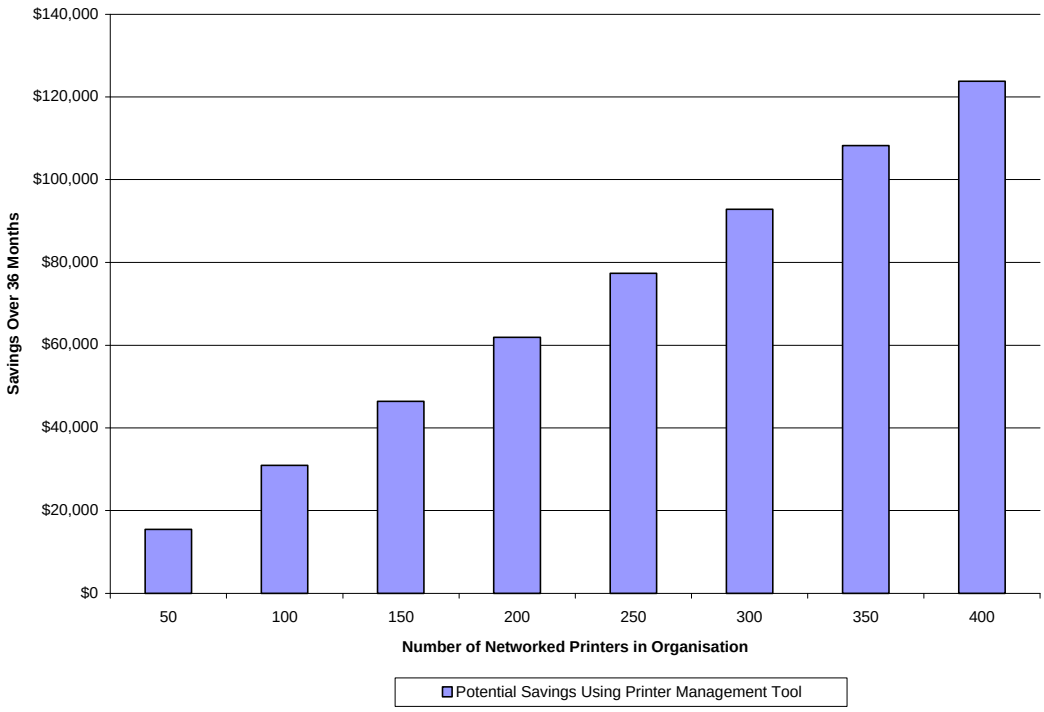
In this particular scenario, either option could be the best solution - however, to make a rational purchase decision, the purchaser must have the following data: the likely number of pages printed per month, plus the likely page coverage.

The cost penalties for purchasing printing equipment without the benefit of well-researched information can be significant.

Assumptions: the capital cost of the printers is $7500 and the capital cost of the copier is $14000. The lease rate used is $30 per thousand over 36 months. The printers use a page toner cost of $0.025 for 5% coverage, while the copier has a fixed click charge of $0.015 cents per page.

Networked Printer Management - Worth the Effort?

Managing printer resources for larger organisations can soak up a surprising amount of resource - for example: research shows that on average, around 15% of IT help desk calls are printer related. Printer management issues such as installation, firmware upgrades and location audits can also add considerably to the 'hidden' bottom-line costs incurred by printers. Implementing printer network management tools such as Hewlett Packard's 'Web Jet Admin' can offer worthwhile savings for sites where printer management has not been a priority. Potential cost saving are graphed below:



Conclusions:

Analysis shows that a site with 200 networked printers has the potential to save nearly $62000 over three years by implementing HP's Web Jet Admin. Larger sites with 400 networked printers could save over $120000. These savings are calculated through reductions in call-out overheads and more efficient management of printer resources.

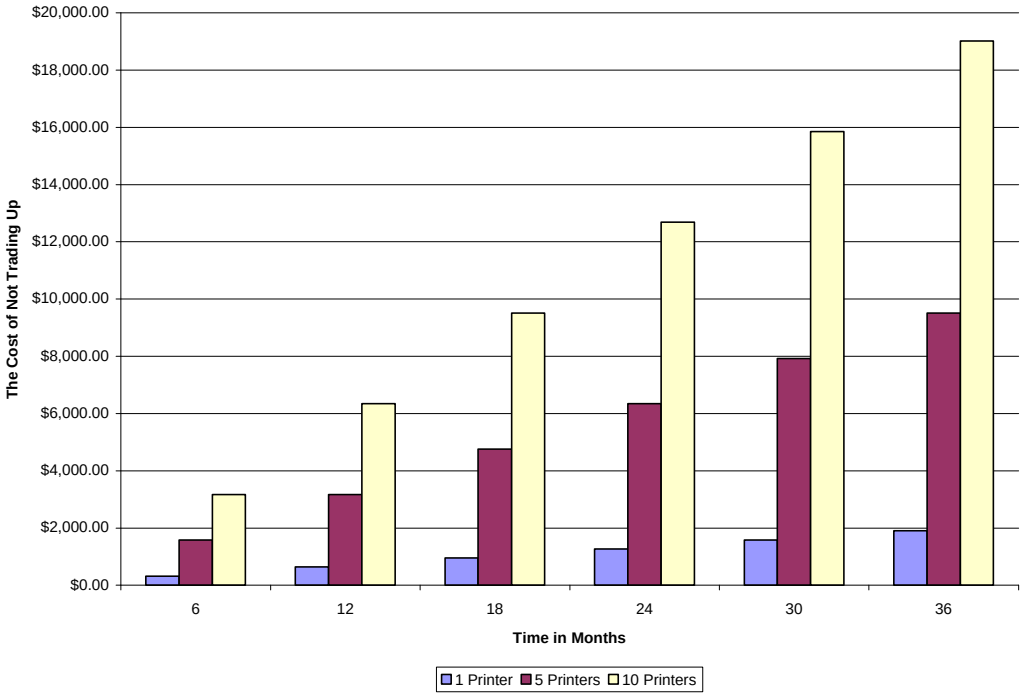
Summary:

The decision to use sophisticated printer network management tools offers organisations with large networked printer fleets clear cost benefits. Implementation of these tools, however, must be carried out in conjunction with a thorough examination of existing printer management practice - cost savings may only be unlocked if an organisation is prepared to re-engineer the way they manage their printer resource.

Assumptions: each networked printer prints on average 3000 pages per month and has a capital value of $1500. The same printer will generate 4-5 help desk calls per year, and by using Web Jet Admin, 20% of these calls can be changed from a technician call-out to a help desk solution. Technicians and help-desk personnel time is valued at $40 per hour. It is assumed that printer resource utilisation can be improved by 10% through employing Web Jet Admin.

The Cost of Not Trading Up

"Just because a printer is getting on - doesn't mean it's not useful -right? Besides, buying a new printer will cost, while keeping 'old faithful' is basically free." This argument appeals to the side of our personalities that wants to ring the last ounce of utility from equipment that has given years of good service - but does it stack up? Comparing running costs of new printers versus older printers produces some surprising results. The graph below shows that keeping older printers can, in most circumstances, prove a costly decision:



Conclusions:

Analysis shows that keeping five LaserJet 111 printers instead of trading up to new LaserJet 4050 models will cost $9500 over 36 months. Retaining just one LaserJet 111 for 18 months will cost nearly $1000 when compared to buying a new LaserJet 4050. This analysis is based on comparing maintenance, toner, power and capital costs.

Summary:

Even though older printer technology may still "do the job", new printers perform better in nearly all respects - lower page, power consumption and maintenance costs. These three factors alone more than compensate for the amortisation of capital cost that a new printer purchase incurs.

There are also other 'hidden' cost advantages to be enjoyed with the replacement of older printers with new models - user interventions are reduced, output quality is improved and additional features such as 'collation' can significantly enhance user productivity.

Assumptions: the analysis compares a LaserJet 111 with a LaserJet 4050 over 36 months. Street prices are used for new printer and consumable costs while monthly printer capital costs are based on a 36 month lease. Print volumes assume 6000 pages per month. Maintenance costs for the LaserJet 111 assume three on-site visits per year, two fusers, one pick up roller and one fan over 36 months.

IPR Company Profile

Independent Printer Review ('IPR') is a market research and consultancy organisation that specialises in the analysis of the digital hard copy industry throughout the Asia Pacific Region.

As an independent research organisation, IPR is not associated with any printer brand, nor does IPR endorse any printer brand in the market place.

IPR Products Include:

'PCC Report': lists the specifications and prices for all mono and colour laser printers sold in the New Zealand Market
'RCA Report': lists the comparative consumable running costs for all mono and colour laser printers sold in the New Zealand market, both by summary and by detailed consumable break-down costs
Summaries Report: ranks mono and colour laser printer by prices, and in addition ranks mono and colour laser printers by mono page cost

End-User Consultancy Services.

- Site document work flow analysis
- Site document cost analysis
- Site printer implementation strategy analysis

Printer Testing and Printer TCO Analysis:

- Consumable testing and bench marking of consumables
- Printer hardware total cost of ownership calculations and analysis
- Hardware comparisons

IPR Principal:

Roger Calvin is the senior analyst and director of IPR. Roger has over 9 years full-time experience in the imaging industry - having an in-depth knowledge of market trends, printer technology, end-user requirements and brand channel strategies. Roger holds a MSc from the University of London.

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