

**REAL PRODUCTION
CAPABILITY OF
PRE-OWNED SHEETFED
LITHO PRESSES**

White Paper - October 2017

Executive summary

Smithers Pira has analysed the offers for sale of pre-owned sheetfed litho presses, under ten years old, that have been advertised by equipment dealers between January and May in 2017. Only presses with their age and impression count were included, a total of 444 unique sheetfed litho presses from Heidelberg, KBA, Komori, Manroland and RMHI (Ryobi and Mitsubishi Heavy Industries). Format ranged from B3 up to B1 (40 inch), with varying numbers of press units and coaters.

These machines were then segmented by size and model, and the annual number of impressions calculated to compare a statistically valid measure of the real-world productivity between the competing press suppliers.

The normalised results are presented in TABLE E.1. Heidelberg has 24.1% more impressions annually than the overall average for machines from all other manufacturers. When segmented by press format Heidelberg machines show the highest number of impressions than the overall average from all manufacturers in each format.

TABLE E.1

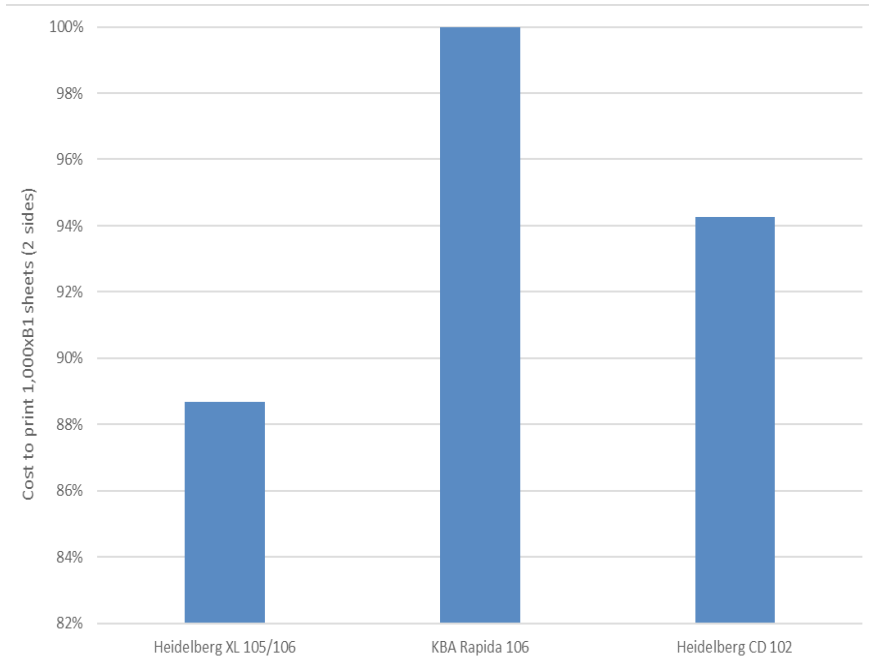
Normalised annual impression count of all machines

	All presses	B1	B2	B3
Heidelberg	100.0%	100.0%	100.0%	100.0%
KBA	81.7%	75.6%	61.9%	14.8%
Komori	72.4%	72.8%	60.0%	64.8%
Manroland	105.7%	82.9%	96.1%	30.3%
RMHI	50.8%	60.1%	36.8%	55.9%
All presses	89.0%	85.4%	83.0%	84.7%
All presses (excluding Heidelberg)	75.9%	73.5%	59.3%	48.2%
Heidelberg premium over other manufacturer average	24.1%	26.5%	40.7%	51.8%

Source: Smithers Pira

This actual press performance data was then put into a model to determine the true cost of producing printed sheets between the newest models from the leading B1 (40-inch) press manufacturers, Heidelberg and KBA.

FIGURE 0.1
Comparative cost of printing 1,000 B1 sheets, two-sided on Heidelberg and KBA B1 sheetfed presses (average run length of 5,000 sheets)



Source: Smithers Pira

These average costs compare the real performances recorded on second-hand machines, showing the lower cost of production for Heidelberg B1 XL presses compared to the KBA Rapida 106.

This is through the higher average productivity measured from the second-hand press impression counts which more than compensates for any price differential.

The paper, ink, coating and plate costs are the same for each machine, while the costs of the presses reflect those typically seen in the marketplace. The average job cost for a four-colour 5,000 sheet run can be calculated from the overall annual costs for each press type. As shown in Figure 0.1, choosing a model such as a CD 102 can provide a higher profitability than a “higher specification” model from an alternative manufacturer when lower annual volumes are produced.

Based on the findings, high-performance Heidelberg XL B1 presses significantly outperform their competition. If companies can sell the output across a year the analysis shows that the profit opportunity for Heidelberg machines is significantly higher than for the competitive models.

Objectives

The objectives of the Smithers study were to:

- Provide a comprehensive analysis of the second-hand presses offered for sale to determine the relative productivity of competing brands in B1 (40-inch) and B2 (29-inch) press formats.

This will provide a measure of age of the machine and impression count, to produce a statistically valid comparison of the performance of different brands and categories in terms of impressions printed per year for a range of press types and format size, including the number of units.

- Complete a comprehensive costing model to show the relative “typical” capital cost of different presses to deliver the same cost of print production per sheet for a range of machines. This will indicate the relative importance between cost of the machine and press performance.

Methodology

The Smithers Pira researchers recorded the details of second-hand sheetfed litho presses offered for sale on various dealer sites throughout the world. The project identified machines less than ten years old at the time of analysis, which were originally installed after 2007. While there are many older machines available for sale these were not included in this analysis.

Details of each press were recorded, with the press manufacturer and model, brief technical specification, year of manufacture and impression count where available. The press records were analysed with duplicates removed – the same press is often advertised on multiple dealer sites with many purporting to be the owner – to produce this definitive list.

The presses were segmented by machine format, and the real productivities were compared by the average number of impressions per year recorded. Further segmentation was performed to compare the latest models from Heidelberg and KBA in B1 format which is known to be the most competitive segment of the sheetfed litho press market.

Results

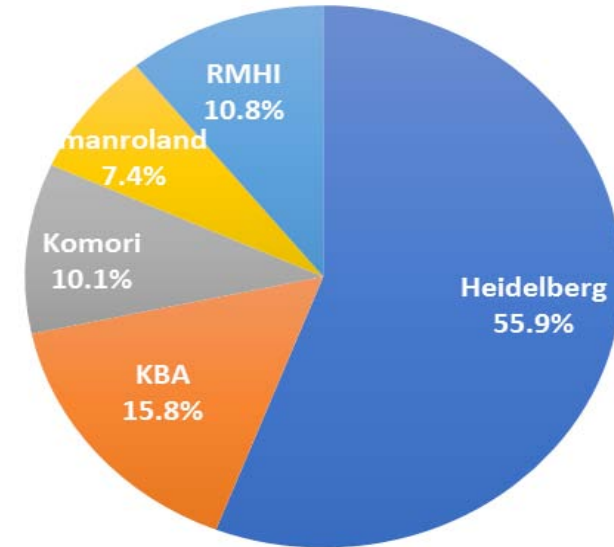
A total of 461 unique presses were identified, excluding many hundred duplicates and machines with no impression count available. From this there were only a small amount of VLF presses (seventeen in total) and all of these were then removed from the analysis as the results were not statistically valid, resulting in a total of 444 presses in the analysis. These were sourced from sixteen individual press dealers, listed in Appendix 1. The specific website entries for each machine are listed individually in Appendix 2.

The leading press suppliers were all present:

- Heidelberg
- KBA (Konig & Bauer)
- Komori
- Manroland
- RMHI.

The distribution of manufacturers is shown in FIGURE 2.1. TABLE 2.1 details the numbers of presses split by press format, with the percentages in each section shown in TABLE 2.2.

FIGURE 2.1
Distribution of all presses



Source: Smithers Pira

These presses are a cross section of all segments of the sheetfed litho technology from small format B3 machines up to B1 with both straight and perfector press data collected. It can be seen that the mix of presses from the different manufacturers vary dependent on format size. In some of the categories only a few presses from certain manufacturers were identified in the research.

TABLE 2.1**Absolute numbers of advertised machines by format**

	All presses	B1	B2	B3
Heidelberg	248	87	103	58
KBA	70	38	28	4
Komori	48	19	25	4
Manroland	30	22	7	1
RMHI	48	20	15	13
Total	444	186	178	80

*Source: Smithers Pira***TABLE 2.2****Shares of advertised machines by format**

	All presses	B1	B2	B3
Heidelberg	55.9%	46.8%	57.9%	72.5%
KBA	15.8%	20.4%	15.7%	5.0%
Komori	10.1%	10.2%	14.0%	5.0%
Manroland	7.4%	11.8%	3.9%	1.3%
RMHI	10.8%	10.8%	8.4%	16.3%
Total	100.0%	100.0%	100.0%	100.0%

Source: Smithers Pira

The average annual impression counts across every machine in the research is shown in TABLE 2.3. The project was commissioned early in 2017 and the age of each machine identified was estimated at the start of the project.

The second-hand press dealers do not provide the month of the installation, so a press originally installed during 2015 is considered to be 1 year old, while a machine in 2007 is 9 years old. This may lead to some small calculation issues for younger machines, but there are relatively few of these in the project and the calculation is the same for each manufacturer and is considered insignificant in the analysis.

Machines with fewer than four units are excluded.

Overall Manroland presses show the highest average annual impression count at 15.45 million impressions, followed by Heidelberg at 14.62 million impressions.

TABLE 2.3**Average annual impression count of machines (million)**

	All presses	B1	B2	B3
Heidelberg	14.62	20.09	14.16	6.14
KBA	11.94	15.19	8.77	0.91
Komori	10.59	14.62	8.49	3.98
Manroland	15.45	16.66	13.61	1.86
RMHI	7.43	12.07	5.21	3.43
All presses	13.01	17.15	11.75	5.20
Presses excluding Heidelberg	11.10	14.77	8.40	2.96

Source: Smithers Pira

When the whole mix of presses is analysed by press format a different pattern emerges. It shows that Heidelberg machines on average have higher annual impression counts than the competition in B1, B2 and B3 press categories. Comparing “All Presses” the overall high result for Manroland is due to a larger proportion of B1 presses in the sample, which on average tend to have higher productivity, while both Heidelberg and RMHI’s average are further impacted by the high number of B3 presses in the sample set. Due to these differences between the press sizes it is appropriate to focus on the results from each of the individual categories and not the average of all presses.

The normalised results are presented in TABLE 2.4 and they show that the average impression count on a Heidelberg press is 24.1% higher than the average from all other manufacturers. Depending on the format chosen Heidelberg presses record average higher impression counts varying from 26.5% to 51.8% higher than the overall average for the non-Heidelberg second-hand machines examined.

TABLE 2.4**Normalised annual impression count of all machines**

	All presses	B1	B2	B3
Heidelberg	100.0%	100.0%	100.0%	100.0%
KBA	81.7%	75.6%	61.9%	14.8%
Komori	72.4%	72.8%	60.0%	64.8%
Manroland	105.7%	82.9%	96.1%	30.3%
RMHI	50.8%	60.1%	36.8%	55.9%
All presses	89.0%	85.4%	83.0%	84.7%
Presses excluding Heidelberg	75.9%	73.5%	59.3%	48.2%
Heidelberg premium over other manufacturer average	24.1%	26.5%	40.7%	51.8%

Source: Smithers Pira

It is not always straightforward to compare the performance of litho presses directly. Many factors will determine the productivity including the press model, the shift patterns, skill of the press operators, work mix, culture of the print company, availability of work and many other factors.

This exercise removes these variables and provides a quantified performance comparison based on the factual impression counts of second-hand presses advertised for sale.

B1 presses

The subset of all B1 press results is shown in TABLE 2.5, showing that Heidelberg machines average more annual impressions than their competitors.

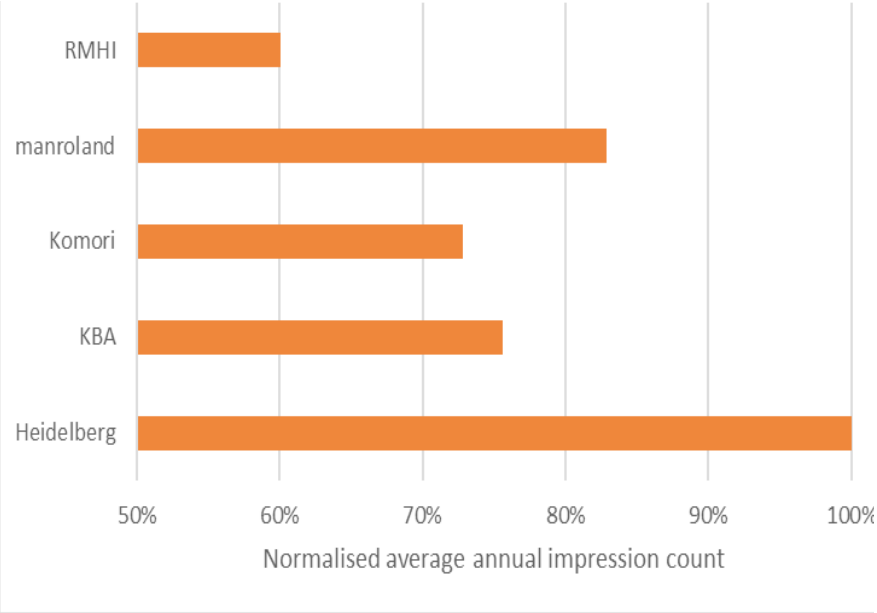
Across all 4-unit and above B1 sized presses Heidelberg machines average 20.09 million impressions annually, followed by Manroland at 16.66 million, 20.62% behind the average Heidelberg machine and KBA at 15.19 million on average.

Overall Heidelberg B1 presses were found to have an average annual impression count more than 36.0% higher than the average of other manufacturers presses offered for sale. In all cases there is a good sample set for each press manufacturer.

TABLE 2.5
Average annual impression count of B1 machines

	Average annual impression count (million)	Normalised	Factor of productivity behind Heidelberg
Heidelberg	20.09	100.0%	0.00%
KBA	15.19	75.6%	32.28%
Komori	14.62	72.8%	37.39%
Manroland	16.66	82.9%	20.62%
RMHI	12.07	60.1%	66.52%
All presses	17.15	85.4%	17.14%
Presses excluding Heidelberg	14.77	73.5%	36.03%

FIGURE 2.2
Normalised annual productivity of all B1 presses



Source: Smithers Pira

The range of presses varies greatly, with straight and perfecting machines, from four colour to 12 print units in the sample. Heidelberg machines include the SX, CD, CX and high-performance XL series of presses. Focusing on the high-performance Speedmaster XL 105 and 106 machines the average impression count has been recalculated and is shown in TABLE 2.6..

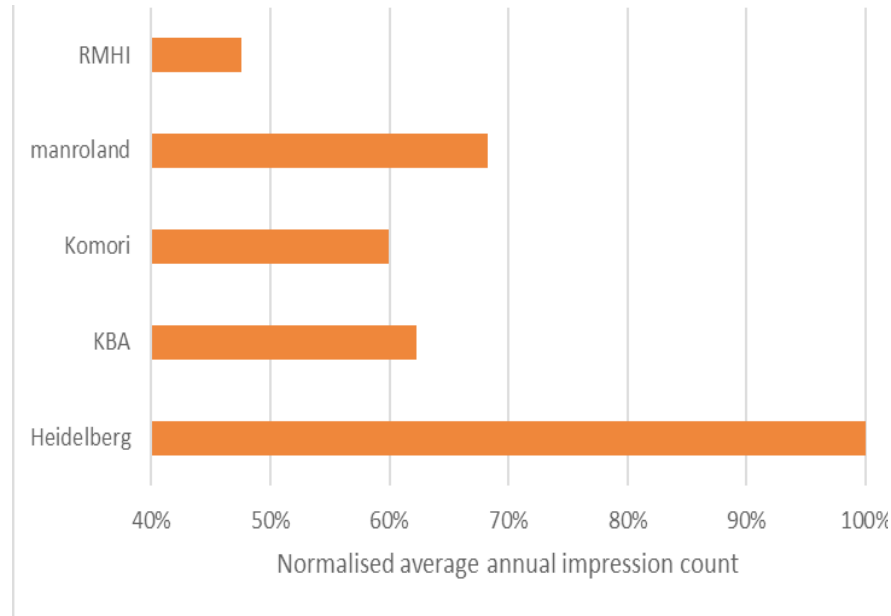
TABLE 2.6
Average annual impression count of high-performance B1 machines

	Average annual impression count (million)	Normalised	Factor of productivity behind Heidelberg
Heidelberg	24.40	100.0%	0.00%
KBA	15.19	62.2%	60.66%
Komori	14.62	59.9%	66.86%
Manroland	16.66	68.3%	46.49%
RMHI	11.62	47.6%	109.98%
All presses	17.31	70.9%	40.98%
Presses excluding Heidelberg	14.77	60.5%	65.20%

Source: Smithers Pira

The average Heidelberg XL impression count is 24.40 million impressions annually, up from 18.80 million, showing an increased productivity differential between Heidelberg XL presses and their competitors. This is shown in FIGURE 2.3.

FIGURE 2.3
Normalised annual productivity of Heidelberg XL 105/106 with other B1 presses



Source: Smithers Pira

The main competition for new high performance B1 sheetfed presses in 2017 is between Heidelberg and KBA. The companies have both boosted the specified performance of their flagship machines, and there are many options that help boost productivity. TABLE 2.7 compares the Heidelberg XL 105/106 with the KBA Rapida 106 machines, the leading modern presses that have been available for ten years or less.

The results include many presses from each manufacturer and show a broad spread for the 38 Heidelberg machines, from 3 to 44 million impressions with an average impression count of 24.4 million. There were 27 KBA presses, with 0.5 to 30.5 million impressions averaging 14.74 million impressions per year. Also included in this is the performance data from 31 Heidelberg CD 102 presses which have similar productivity to that from the KBA 106.s.

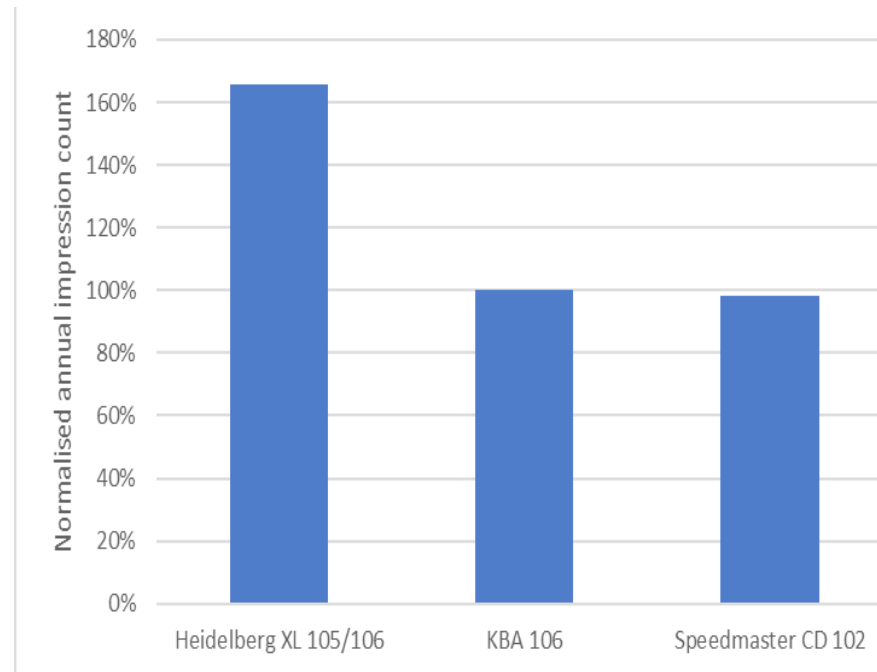
TABLE 2.6
Average annual impression count of high-performance B1 machines

	Sample size	Average annual impression count (million)	Normalised	Annual impressions (million)	
				Max	Min
Heidelberg XL 105/106	24.40	100.0%	0.00%	44.0	3.0
KBA Rapida 106	15.19	62.2%	60.66%	30.5	0.5
Heidelberg CD 102	14.62	59.9%	66.86%	26.0	2.8

Source: Smithers Pira

This data is shown graphically in FIGURE 2.4 with the Heidelberg XL machines considerably ahead of the KBA Rapida 106. The figures show the Heidelberg XL-series of B1 presses deliver an average of 66.5% more impressions than the KBA alternative annually.

FIGURE 2.4
Comparison of normalised average annual impression count, Heidelberg XL 105/106, KBA Rapida 106 and Heidelberg CD 102



B2 Presses

In a similar analysis to the B1 presses, the subset of four-unit and above B2 press results is shown in TABLE 2.8. The results again show that Heidelberg machines average more annual impressions than their competitors.

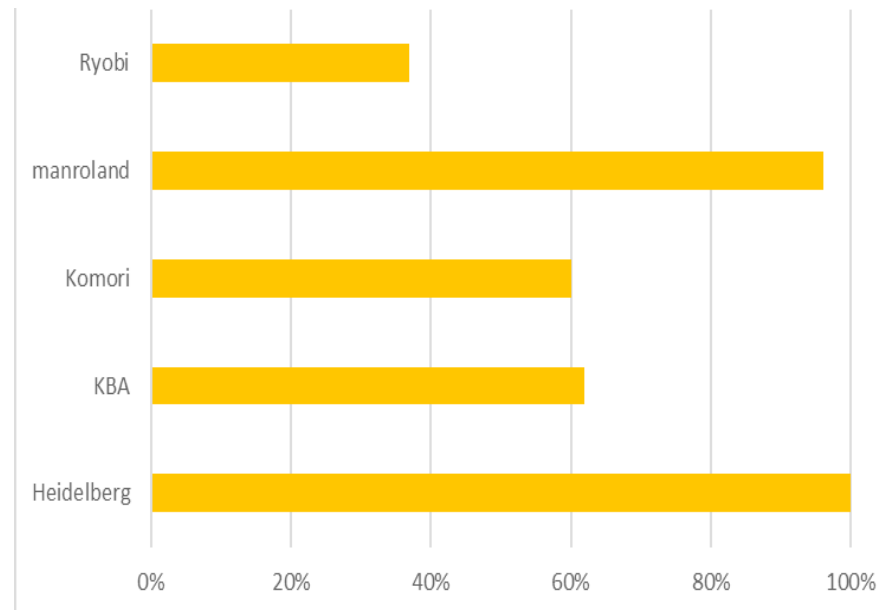
TABLE 2.8
Average annual impression count of B2 machines

	Average annual impression count (million)	Normalised	Factor of productivity behind Heidelberg
Heidelberg	14.16	100.0%	0.00%
KBA	8.77	61.9%	61.48%
Komori	8.49	60.0%	66.72%
Manroland	13.61	96.1%	4.03%
RMHI	5.21	36.8%	171.53%
All presses	11.75	83.0%	20.46%
Presses excluding Heidelberg	8.40	59.3%	68.53%

Source: Smithers Pira

Across all of the B2 presses Heidelberg machines average 14.16 million impressions annually, followed by Manroland (with a very limited sample size of only 7 presses) at 13.61 million which is 4.03% behind the average Heidelberg. KBA B2 presses average 8.77 million annual impressions, while the average from all manufacturers excluding Heidelberg is 8.40 million.

FIGURE 2.5
Normalised annual productivity of all B2 presses



Source: Smithers Pira

Overall, Heidelberg B2 presses were found to have an average annual impression count more than 68.5% higher than the average of other manufacturers presses.

Comparative costing

Digitally Smithers Pira has used its comparative costing tool that compares the performance of different printing systems. The model has been developed for use by a range of print equipment suppliers, and it has been featured in many Smithers Pira reports, including [The Future of Digital vs Offset Printing to 2022](#) published in 2017.

The model follows the approach taken by many print service providers, in a similar manner to Budgeted Hourly Rate calculations. It incorporates elements including capital and financing costs using typical prices paid in the industry, energy usage, service and repairs (related to the cost of the press) and direct labour on a specific shift pattern. It then adds in paper cost and waste (set up and running), cost of plates, productivity metrics at various ink usage settings with or without coatings.

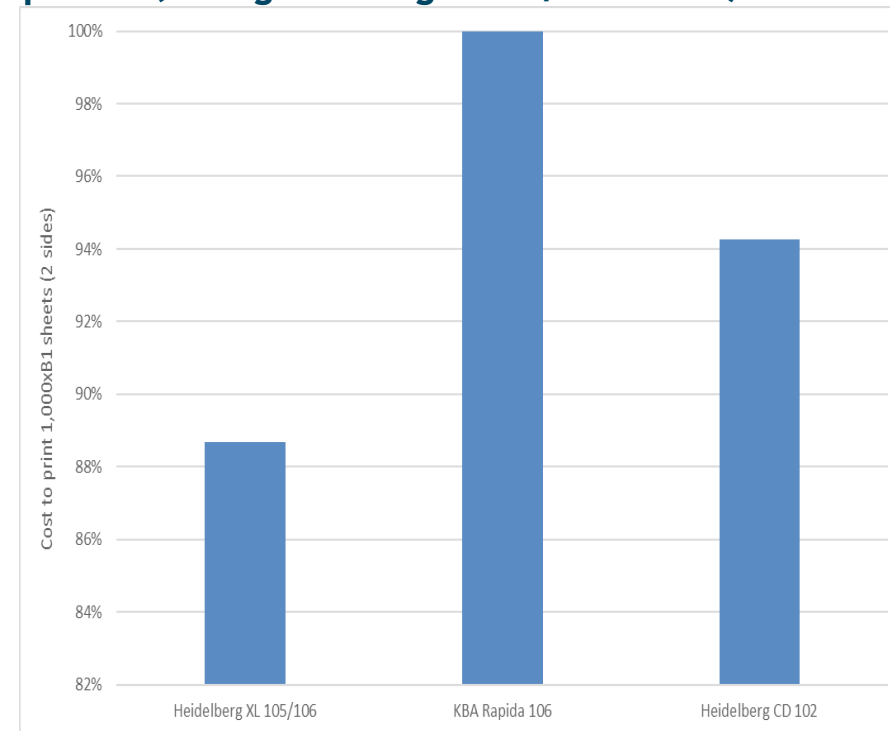
This generates a comparative unit cost of production to determine the direct manufacturing costs from alternative presses.

The model compared five-unit models of the Speedmaster XL 105/106 with the KBA Rapida 106 and the Speedmaster CD 102. The hours are calculated from a 2-shift pattern, assuming 85% uptime and assuming an average run length of 5,000 sheets. The average impressions recorded are 24.4m for the XL Heidelberg presses, 14.74m for the Rapida 106 and 14.51m for the Speedmaster CD 102 models. This factor is important and is used in the model for the relative performance of the different presses.

The direct costs of print production for the three presses are calculated assuming 7 year depreciation with the cost of capital at 5% for a new machine and a 27% premium for the Heidelberg XL press compared to the KBA. It uses the same labour cost for the double-shift operation, using typical commercial B1 paper costs to calculate the direct cost of printing 1,000 sheets (with an average run length of 5,000 sheets)

From this model the relative cost of printing 1,000 sheets is shown in FIGURE 2.6.

FIGURE 2.6
Comparative cost of printing 1,000 B1 sheets, two-sided on Heidelberg and KBA B1 sheetfed presses (average run length of 5,000 sheets)



Source: Smithers Pira

These average costs, based on the real press performances, show a lower cost of production for Heidelberg B1 XL presses compared to the KBA Rapida 106. This is through the higher average productivity measured from the press impression counts.

The data shows the importance of selecting the appropriate press for the production volume with the Heidelberg XL and CD presses being more cost effective in producing 1,000 sheets. Similar and larger reductions in the cost of production are found when comparing the Heidelberg XL presses to those from the other press manufacturers in the report.

Conclusion

The analysis shows that Heidelberg presses produce higher volumes of print annually than competitor machines on average.

This proven higher productivity allows users to sell more output from each Heidelberg press than from other manufacturers. This additional productivity provides a significant competitive advantage to Heidelberg machines.

The direct cost of print production for 1,000 sheets has been analysed using the Smithers Pira costing model for B1 presses and this shows significantly lower costs from Heidelberg presses, the choice of press dependent on the production volumes of the printer.

The analysis shows that the profit opportunity for Heidelberg machines is significantly higher than for competitive models.

Appendices

- A complete listing of second-hand equipment sellers analysed for this report is available for [*download now as Appendix 1*](#)
- A complete listing of the individual machines profiled in this Smithers Pira study is available for [*download now as Appendix 2*](#)