

Digital Press Benchmarks: Availability & Actual Production

Xerox iGen4, HP Indigo 7000, Indigo 5500, Indigo 7500, and Indigo 7600

Many print providers, and even press manufacturers themselves, are asking the question: *How much time can be spent printing – actually printing sellable sheets?*

Digital presses are increasingly able to create excellent print quality. As the demands and expectations for digital presses increase, maximizing Actual production time – time printing sellable pieces – is becoming a pivotal issue, playing a crucial role in the value of a press. Higher Operational Availability, the percentage of *Actual* to *Potential* production time, equates to improved performance, lean operations, a higher Return-on-Investment and the resultant financial advantages. Consistent Availability allows print management to perform more accurate cost estimates. Through the reduction of setup, maintenance, service time, etc., the consequential net increase in Availability offers print providers increased opportunity, competitiveness, and profit.

SpencerLAB's unique benchmarking study of digital press Availability – perhaps the first of its kind – required intensive research. In order to accurately and successfully study Availability and Actual production time, it was necessary to determine and collect utilization metrics specific to the commercial digital printing environment. Design of the methodology was critical. Procedures and tools were designed that enabled efficient collection of data in a high-productivity commercial press environment. *SpencerLAB* was able to establish test parameters and protocols that allow quantitative determination of the *Potential* production time as well as the *Actual* production time, time that is utilized producing sellable print pieces.

In this application of our methodology *spencerLAB* measured five digital presses in real commercial operation. Our results showed significant differences among them, with the iGen4 achieving the highest Availability among the tested digital presses, substantially more than that of the HP Indigo 7000, 5500, 7500, and 7600.

EXECUTIVE SUMMARY

The *spencerLAB* DIGITAL COLOR LABORATORY was commissioned by Xerox Corporation to perform an independent benchmarking study, to estimate the level of digital press Availability by determining Potential and Actual production time measurements of a Xerox iGen4, an HP Indigo 7000, an HP Indigo 5500, an HP Indigo 7500, and an HP Indigo 7600 digital press.

The Xerox iGen4 achieved the highest machine Availability of the evaluated commercial presses, outperforming the four HP Indigos. Higher machine Availability means higher performance – more sellable print pieces in the hands of customers, and greater income for the digital press owner.

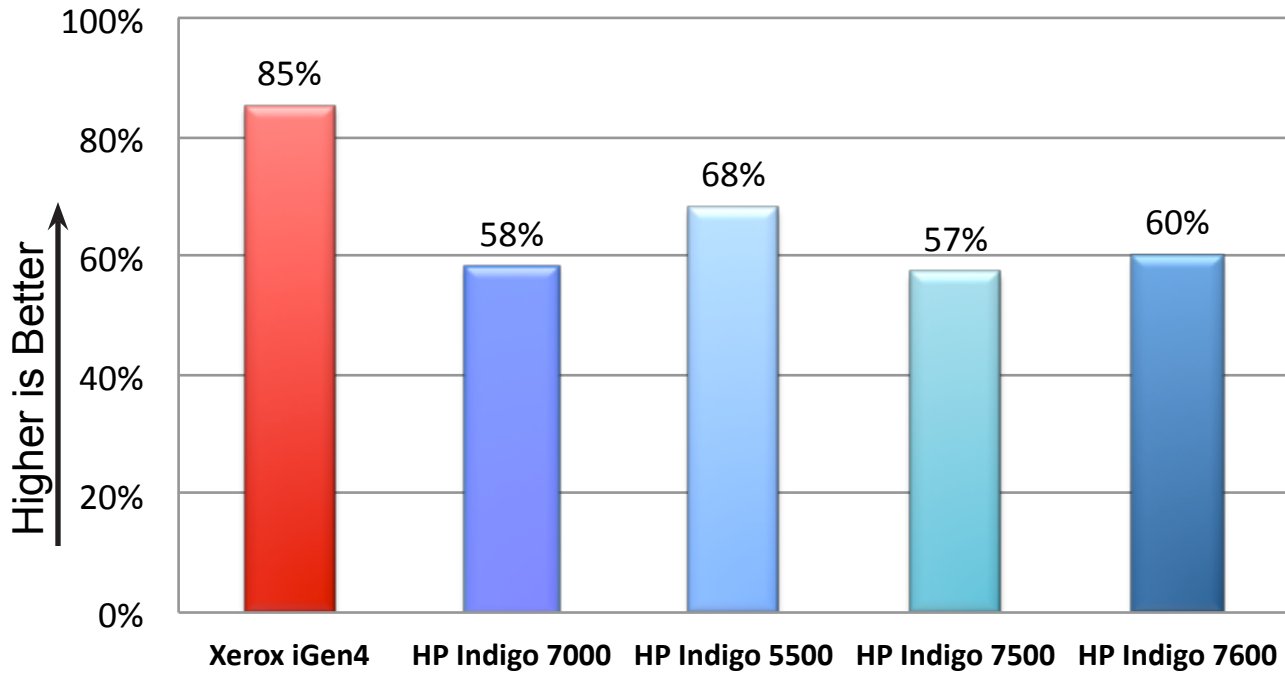
Several commercial install sites were contacted to explore the study approach; *SpencerLAB* then partnered with one install site per press. The participating print shops were typical commercial printing operations.

It is understood that results of this study may not represent the general population of press installs; however, these results do provide – for perhaps the first time – anecdotal insight into the Availability of the tested digital presses.

SpencerLAB provided on-site training to the operators, technicians, production managers, and various other personnel involved at each of these partner sites in order to communicate data collection requirements and techniques.

WHITE PAPER

Average Machine Availability*



*Results based upon a single commercial install of each press for 20 workdays

Performance data was collected by the press operators themselves for a period of one month (four calendar weeks – 20 workdays), then reviewed and analyzed by *spencerLAB*.

SpencerLAB designed strategic filters that categorized every press and non-press related activity during each of the 20 workdays. Excluding Non-Press Delays, the Potential production time categories include: Morning Routine, Repair, Service, Consumable Change, Planned Maintenance, Paper Jam, Waiting for Press, Job Setup, Quality Control, and Press Error Waste as well as the Actual production time – Producing Sellable Print Pieces. Quantitative data analysis metrics were then calculated to determine the Availability of the presses [see chart, p3].

$$\text{Availability} = \frac{\text{Actual Production Time}}{\text{Potential Production Time}} \%$$

KEY FINDINGS

The Xerox iGen4's consistently high actual daily machine production time contributed to its highest aver-

age Availability for the test period. The tested iGen4 recorded lower average time spent on most of the press-related activities than the tested Indigos, utilizing more of the Potential production time to produce sellable print pieces.

This study also helps to identify opportunities for improvement, which may help vendors and their customers recapture lost Potential production time and offer a more lean and efficient service.

While lack of operator training and non-optimized RIP/workflow can significantly increase the time to produce a sellable printed piece, many operators of these digital presses have undergone rigorous training, often by the press manufacturers, and it is assumed that they are capable of operating the press to its best capacity as per manufacturers guidelines.

Our summary finding is that *the Xerox iGen4 achieved the highest machine Availability among the tested digital presses, substantially more than the tested HP Indigo presses, thereby providing greater Actual production time* [see chart, above].

METHODOLOGY

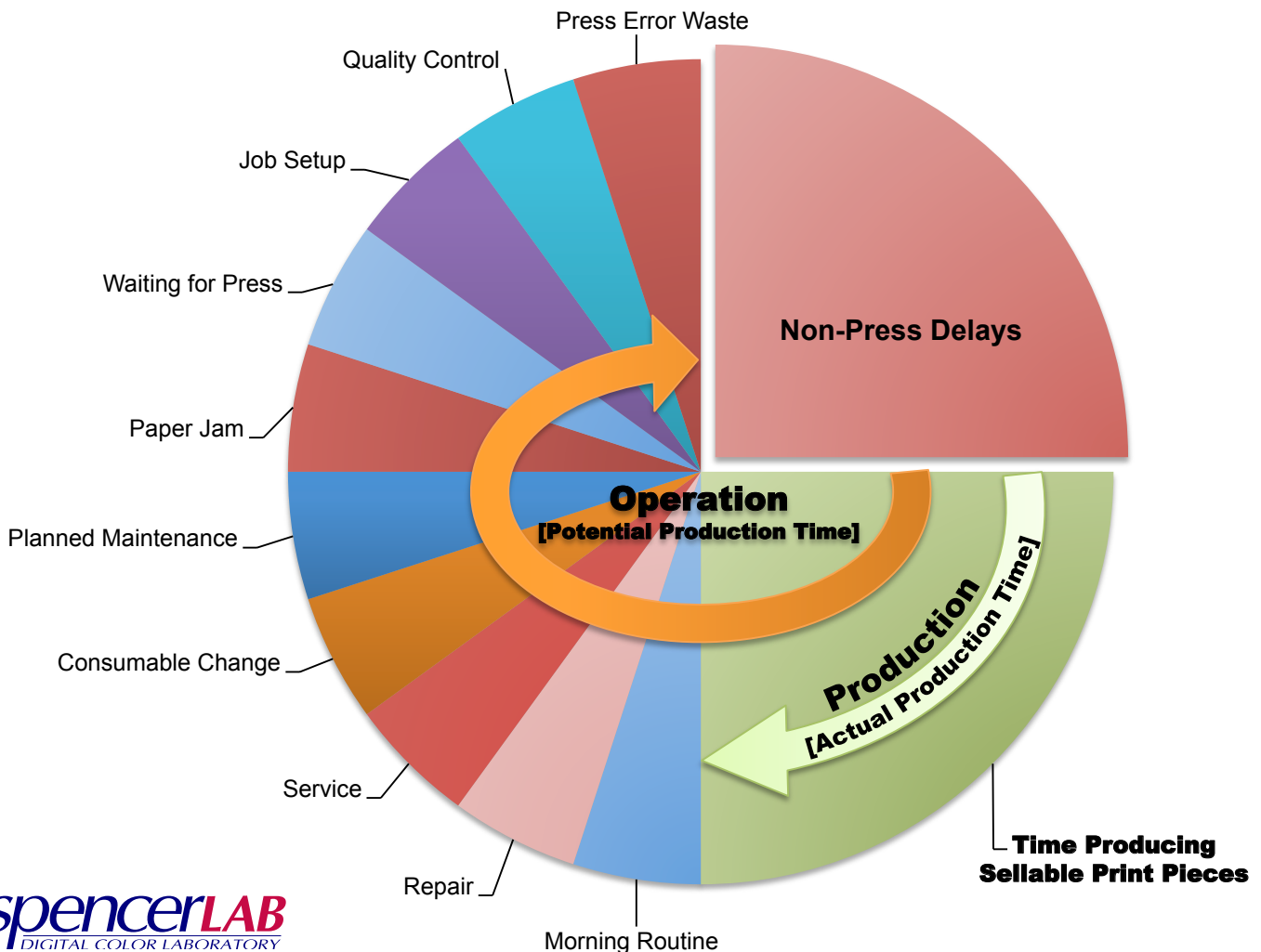
In order to be able to benchmark the utilization of Potential production time for digital presses, *spencerLAB* spent considerable time and effort to design and implement a research methodology that would provide quantitative data analysis results based on common parameters – while being equitable to each of the competitive devices from which data was collected and evaluated. *SpencerLAB*'s analytic approach seeks and eliminates variances among non-press-related events by determining the Potential and Actual production times of each of the tested digital press operation, and then deriving the Availability percentage of each press from that data.

- In order to estimate the level of digital press Availability, *spencerLAB* established test parameters and protocols that adapt and apply the concepts of production equipment availability and productivity to commercial digital printing. The aim of establishing the protocols was to be able to quantitatively determine how much time is really spent in producing sellable print pieces.

- *SpencerLAB* designed guides and tools to assist real-time data tracking and recording by the operators themselves. Care was taken to ensure efficient data collection without burdening the operators or interfering with their workday activities.

- In order to study digital press usage in a commercial print environment, *spencerLAB* contacted several commercial install sites and explored the study approach, and then partnered with one (1) install site per press.

Availability: Potential vs. Actual Production Time



The participating print shops were typical commercial printing operations.

- *SpencerLAB* provided on-site training to the operators, technicians, production managers, and various other personnel involved at each of the partner sites, to communicate data collection requirements and techniques. Press data was collected for a one-month period (four calendar weeks – 20 workdays).
- This study did not take into account print content. Each commercial printer continued to print their normal job flow. Therefore, some variance may be attributed to different types of print jobs and/or quality requirements of the final output; however, we believe that a month of data provides a reasonable estimate of press behavior, irrespective of the printed piece itself.
- *SpencerLAB* designed strategic filters to categorize every event from each workday into Non-Press Delays and Potential Print Time (including Morning Routine, Repair, Service, Consumable Change, Planned Maintenance, Paper Jam, Waiting for Press, Job Setup, Quality Control, Press Error Waste, and Actual Print Time). Quantitative data analysis was performed on the real-time data to determine the mean (average) Availability of the tested digital presses, the percent of Potential production time producing sellable print pieces.

DETAILED FINDINGS

The following section presents the Potential production time usage for each press – the detailed categorization of production time metrics and resultant machine Availability and consistency.

POTENTIAL AND ACTUAL PRODUCTION TIME

The Potential production time is that portion of the workday that can be used for printing. It excludes the time spent on all non-press related activities during a workday. Once the Potential is determined, the Actual production time and Availability – a benchmark of print production performance – are derived by excluding the time spent on all the other press-related events and including only the time spent in printing either a job or a proof that can be sold to generate income.

During this Potential production time, the more time a press spends actually producing sellable print pieces without experiencing press-related stoppages, the more benefits will be realized. Press Availability can be maximized by reducing other press-related delays and consequently having more time to print sellable pieces.

Availability was calculated as a percentage of each measured workday's Potential production time; the mean was then calculated to determine the month's average.

Xerox iGen4

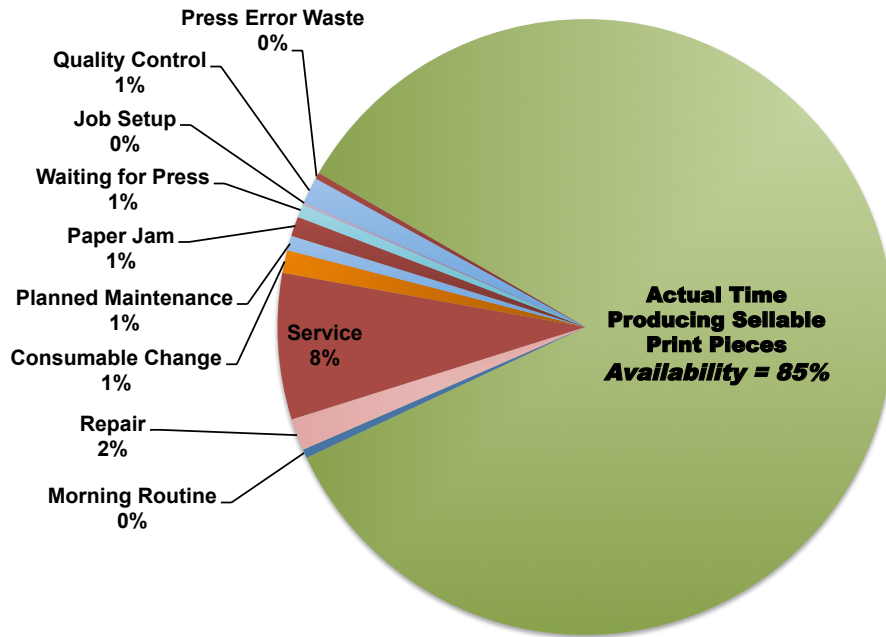
The Xerox iGen4 achieved the most utilization of its Potential production time with the highest average Availability for the test period. Negligible time was spent on Morning Routine and Job Setup. Consumable changes required only 1% of the Potential production time. The average time spent on Servicing the press was 8% and in-house Repair was 2%. The Xerox iGen4 achieved the highest average press Availability of 85% .

The maximum of 100% Availability was achieved on two days during the 20-workday period, which implies that on those workdays, the press printed continuously without any press-related stoppages – it had the maximum utilization of the total Potential production time available. The iGen4 operated at over 80% Availability for 16 days of the 20-workday period. The lowest Availability achieved by the iGen4 on one day was 55%, primarily due to a press Service-related delay. The iGen4's overall high daily utilization contributed to its high average Availability.

HP Indigo 7000

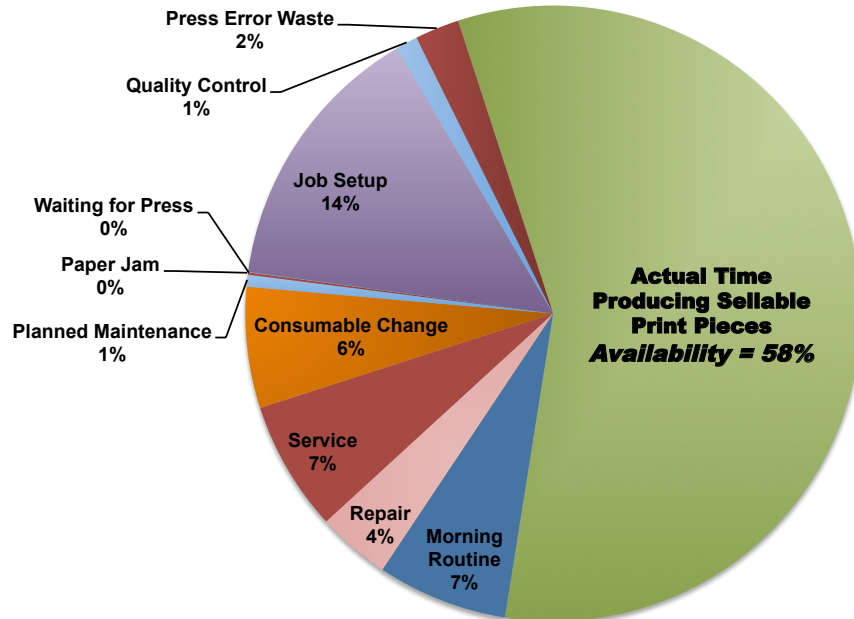
The HP Indigo 7000 achieved a lower utilization of its Potential production time than the iGen4, with a lower average of Availability for the test period. In addition to a 7% Morning Routine, there was a substantial amount of time (14%) spent on Job Setup; Consumable changes took 6% of the Potential. The average time spent on Servicing the press was comparable to the iGen4 at 7%, and in-house Repair was 4%. The HP Indigo 7000 achieved a low average Availability of only 58%.

Average Potential Production Time: Xerox iGen4*



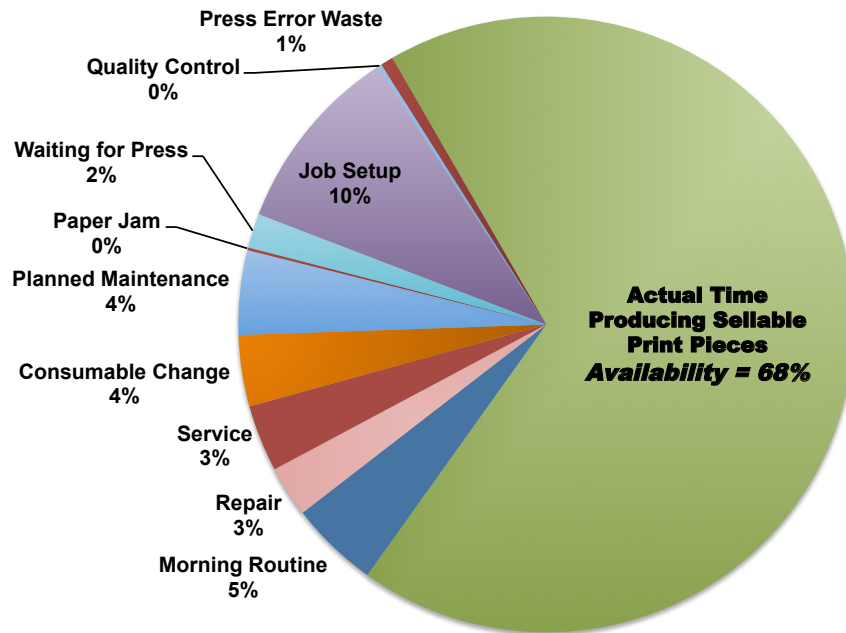
*Results based upon a single commercial install of each press for 20 workdays

Average Potential Production Time: HP Indigo 7000*



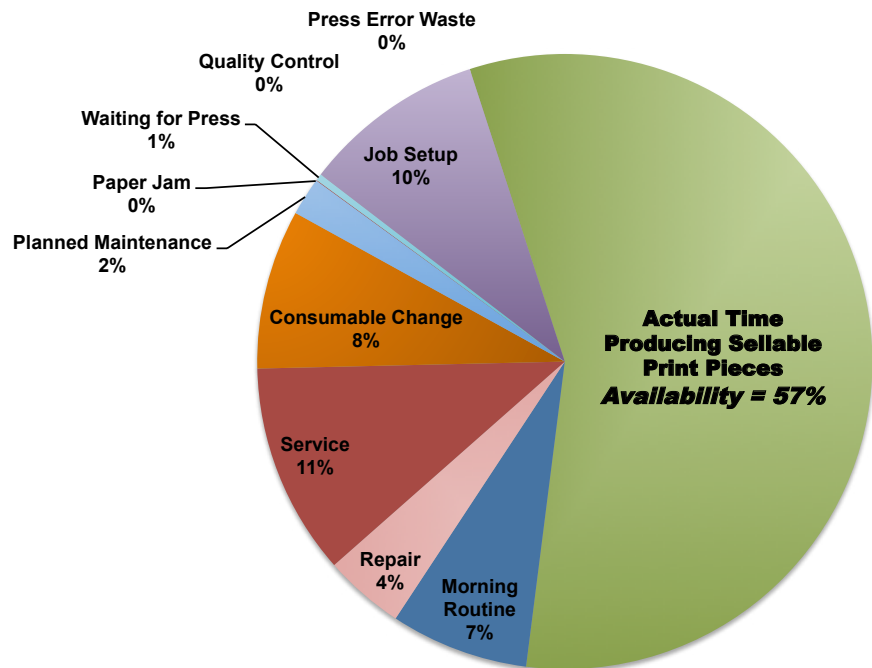
*Results based upon a single commercial install of each press for 20 workdays

Average Potential Production Time: HP Indigo 5500*



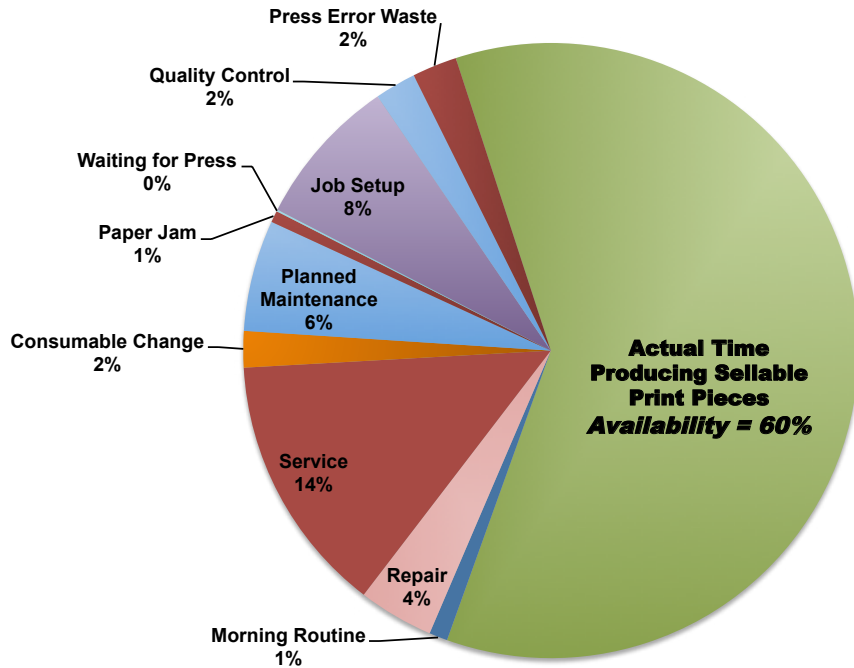
*Results based upon a single commercial install of each press for 20 workdays

Average Potential Production Time: HP Indigo 7500*



*Results based upon a single commercial install of each press for 20 workdays

Average Potential Production Time: HP Indigo 7600*



*Results based upon a single commercial install of each press for 20 workdays

The maximum Availability achieved on one day during the 20-workday period was 79%; that is, on the day of its best performance, the press experienced press-related stoppages/delays accounting for 21% loss of utilization of the Potential production time. The lowest Availability logged by the Indigo 7000 on one day was 24%, primarily due to a machine Service-related delay.

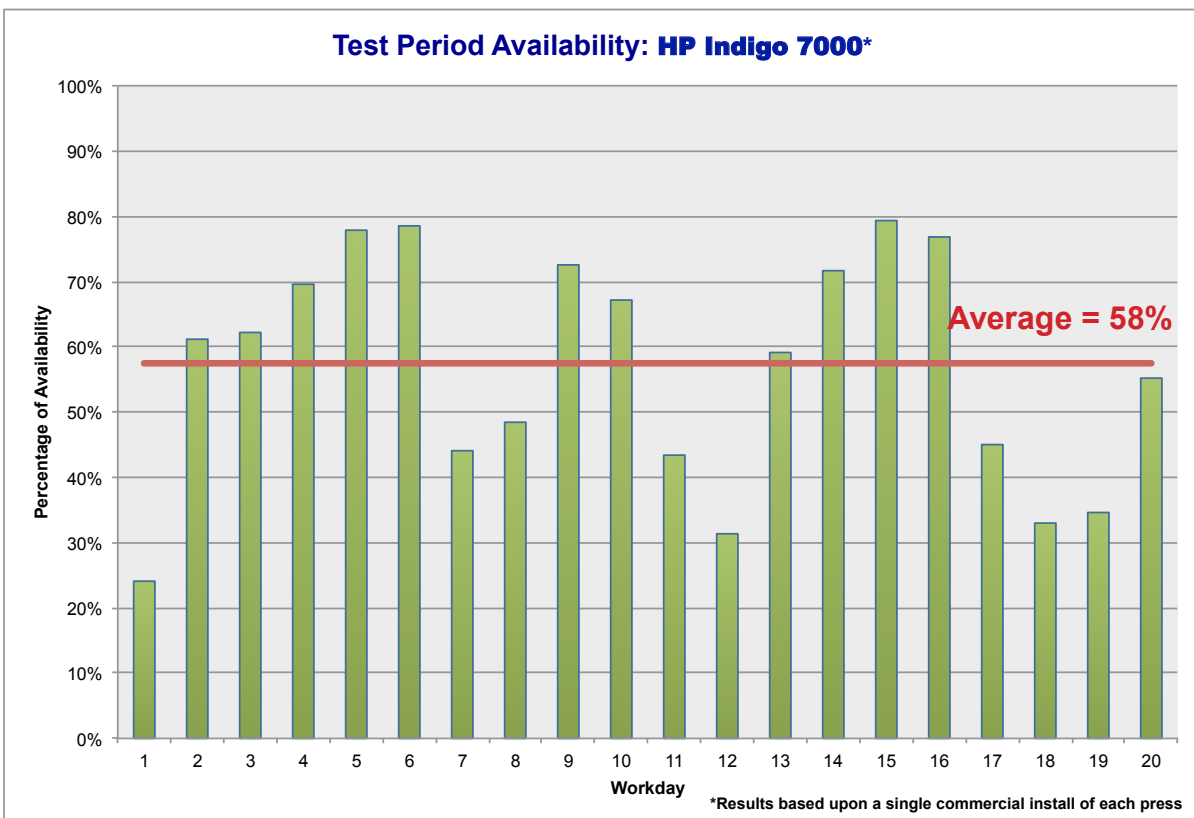
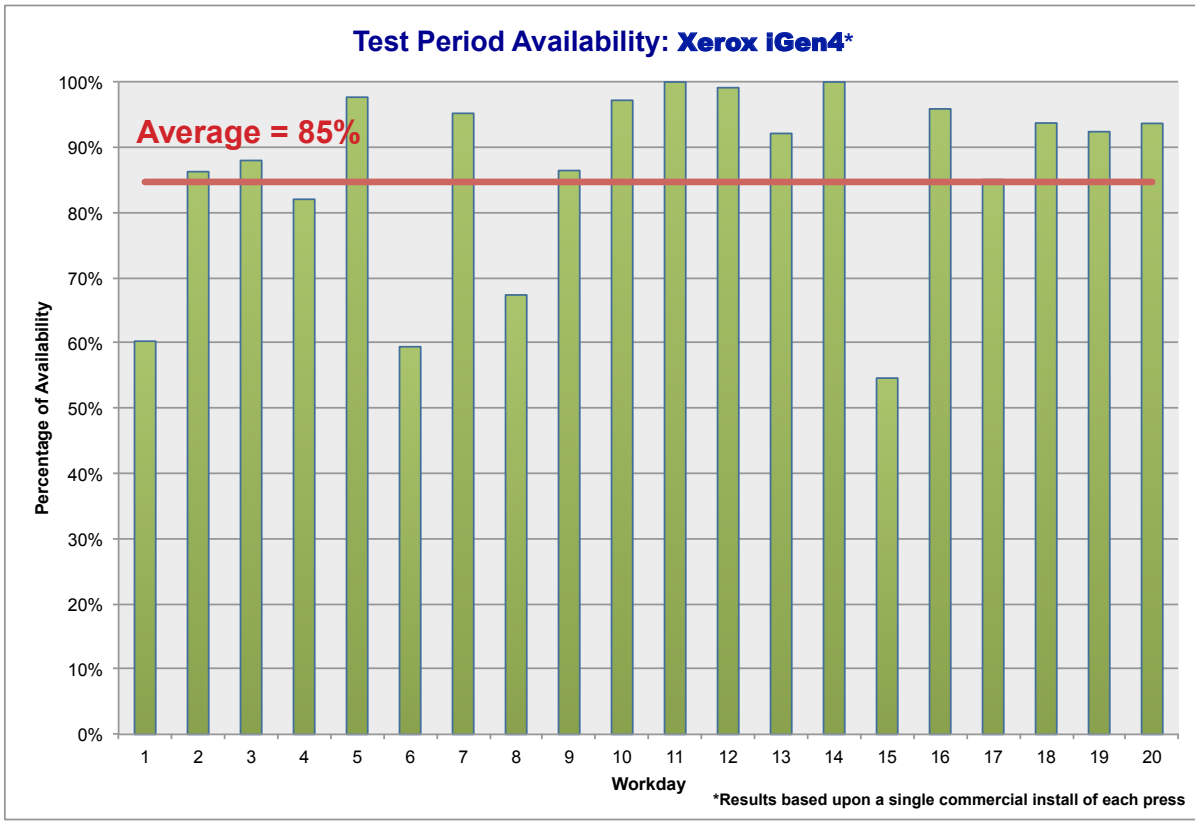
HP Indigo 5500

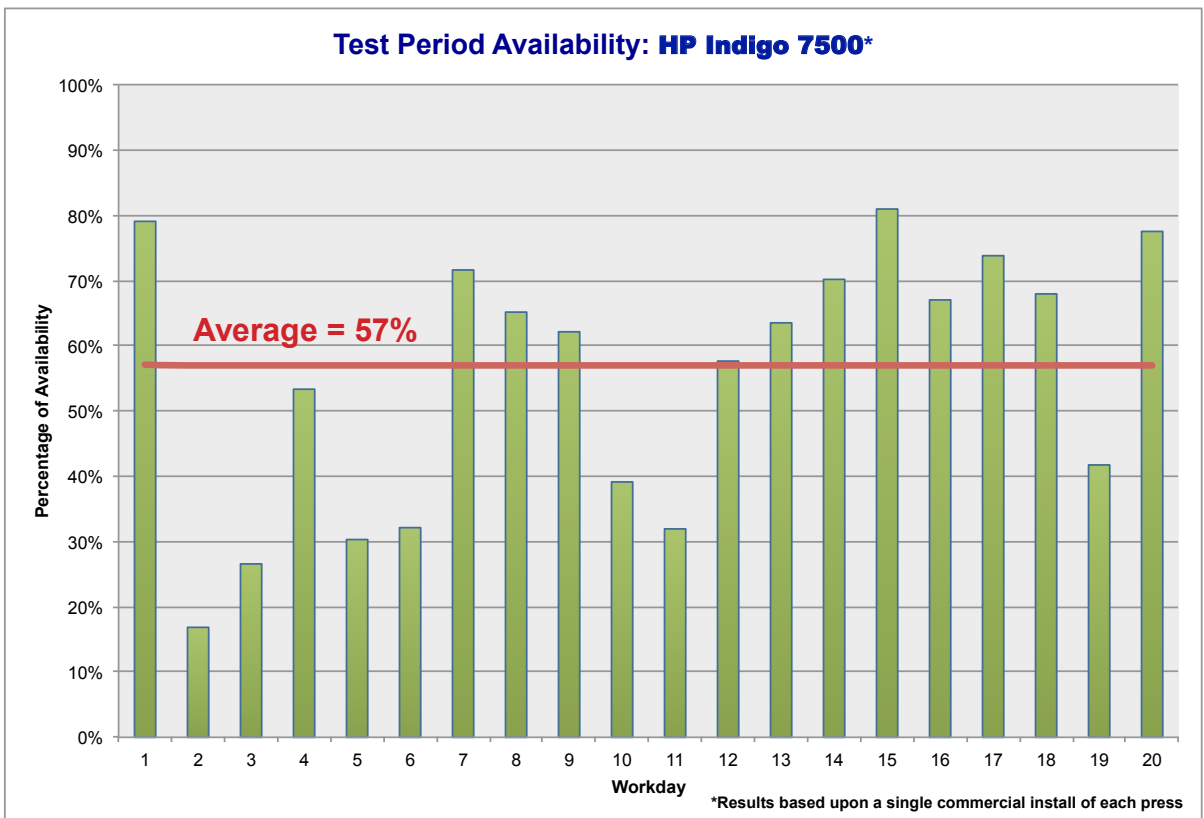
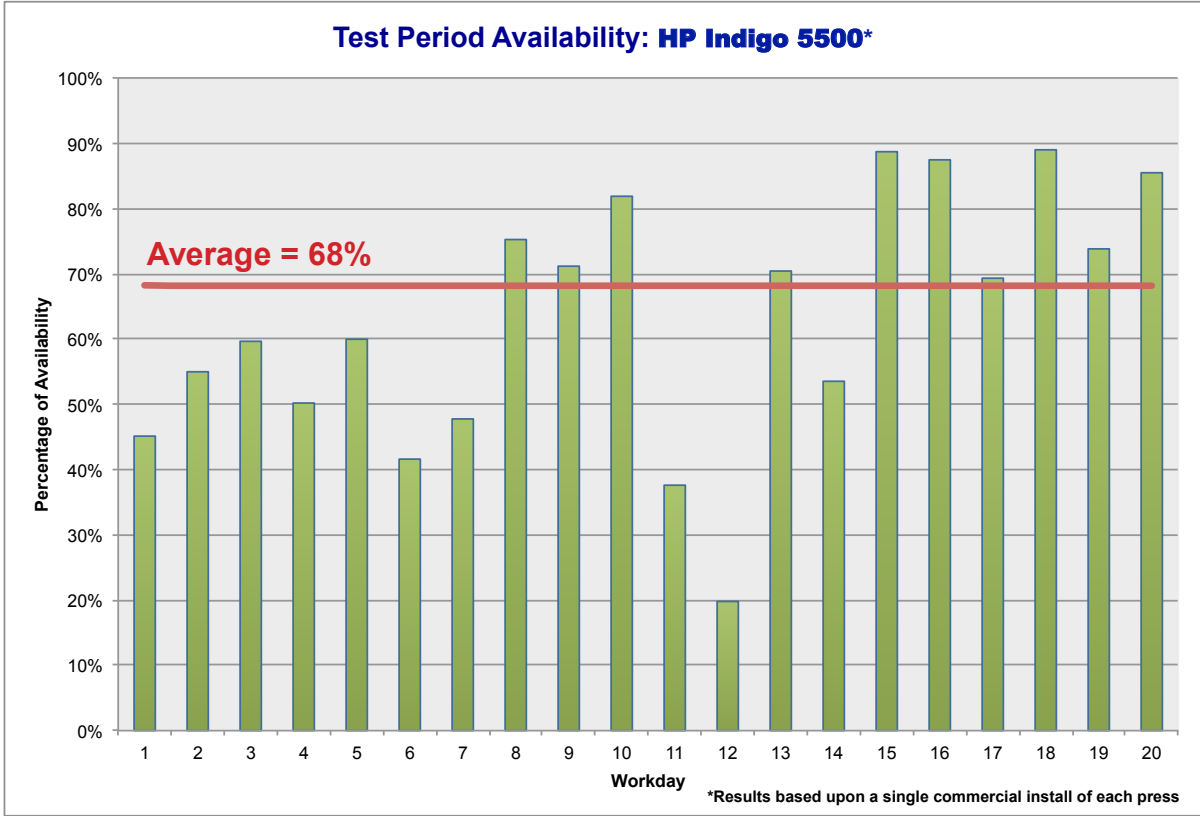
Availability of the HP Indigo 5500 was higher than the HP Indigo 7000, 7500, and 7600, but lower than that of the iGen4. In addition to a 5% Morning Routine, as with the Indigo 7000, 7500, and 7600, there was a substantial amount of time (10%) spent on Job Setup. Consumable changes accounted for 4% of the Potential production time. For the test period, the average time spent on Service and Repair was 3% each, with 4% time spent on Planned Maintenance, which may have contributed to keeping Service and in-house Repair time low. Over the 20 workdays the HP Indigo 5500 achieved an average Availability of 68%.

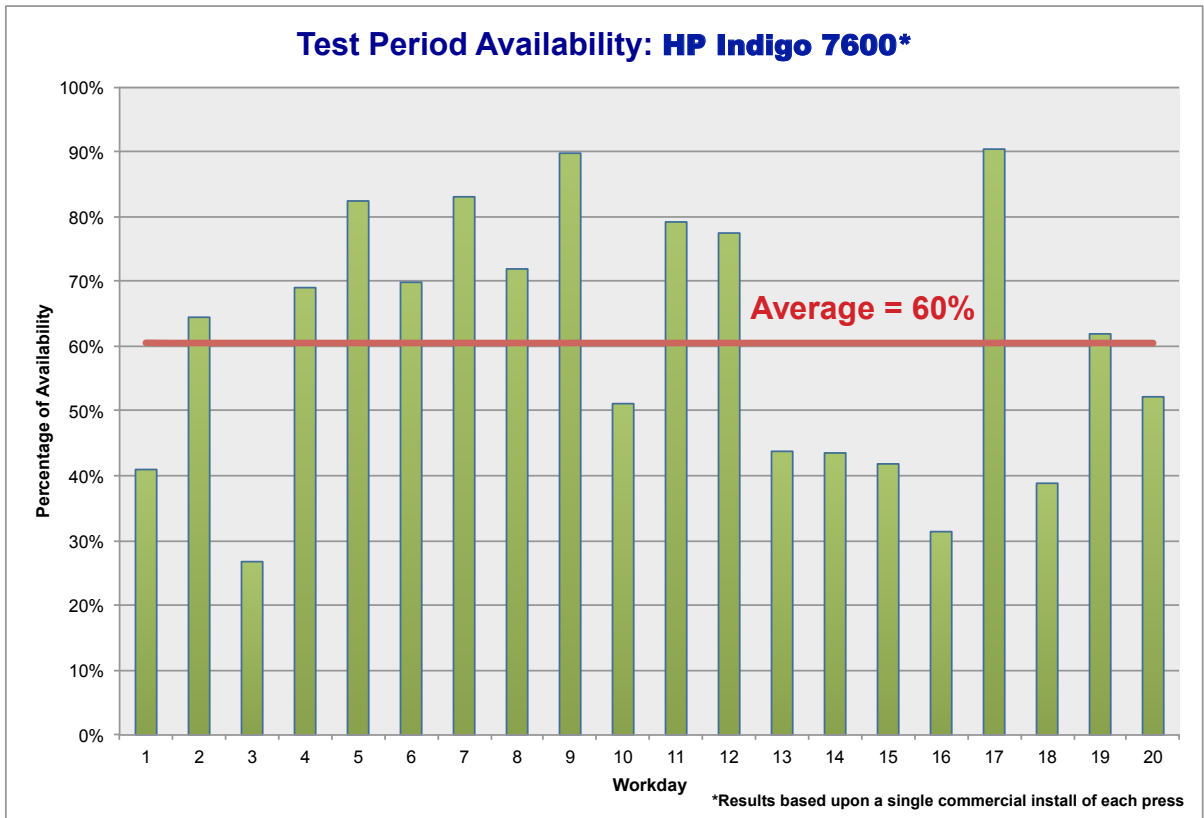
On the day of its best performance the Indigo 5500 achieved a maximum Availability of 89%. The lowest Availability achieved by the Indigo 5500 on one day was 20%, with the remaining 80% of the Potential production time forfeited to miscellaneous press-related stoppages; had this time been utilized to increase the production of more sellable printed pieces, there would have been a correspondingly increased ROI.

HP Indigo 7500

The HP Indigo 7500 achieved the least utilization of its Potential production time with the lowest average Availability for the test period among the tested presses. In addition to a 7% Morning Routine, as with the Indigo 5500, 7000, and 7600, there was a substantial amount of time (10%) spent on Job Setup. Consumable changes took 8% of the Potential, highest among the tested presses, allowing less time to be available for printing sellable print pieces. The average time spent on Servicing the press was 11%, and in-house Repair was 4%. As a result of all these delays encountered while running the press over the







test period, the HP Indigo 7500 achieved the lowest average Availability of only 57%.

The maximum Availability achieved on one day during the 20-workday period was 81%. The lowest Availability logged by the Indigo 7500 on one day was just 17%, primarily due to a machine Service-related delay.

HP Indigo 7600

Availability of the HP Indigo 7600 was higher than the HP Indigo 7000 and 7500, but lower than that of the Indigo 5500 and the iGen4. Job Setup accounted for 8% of the Potential production time. Even though the 7600 recorded the highest average time spent on Planned Maintenance (6%), there was a substantial amount of time spent on Repair (4%) and Service (14%). Service on the 7600 was the highest among all tested presses. For the test period, the average time spent on the 7600 for most of the other press-related activities such as Morning Routine, Consumable Change, Quality Control, etc., were comparable to

that of the iGen4. Over the 20 workdays the HP Indigo 7600 achieved an average Availability of 60%.

On two days during the 20-workday period, the Indigo 7600 achieved a maximum Availability of 90%, a higher per day performance than other tested Indigos. The lowest Availability achieved by the Indigo 7600 on one day was 27%, primarily due to a machine Service-related delay; the remaining 73% of the Potential production time forfeited to miscellaneous press-related stoppages.

Press	Morning Routine	Job Setup	Consumable Change
Xerox iGen4	Negligible		1%
HP Indigo 7000	7%	14%	6%
HP Indigo 5500	5%	10%	4%
HP Indigo 7500	7%	10%	8%
HP Indigo 7600	1%	8%	2%

CONSISTENCY

Higher consistent Availability of a digital press makes it more predictable, thereby minimizing unexpected resource reallocation. It allows print shop management to estimate costs with higher accuracy.

The Xerox iGen4 provided the most consistent performance with a 14% standard deviation of Availability over the test period. The HP Indigo 7000, the 5500, the 7500, and the 7600 recorded less consistent Availability standard deviations of 18%, 19%, 20%, and 20%, respectively.

FURTHER RESEARCH

SpencerLAB believes further research is warranted to corroborate these initial results by benchmarking these press models in additional commercial locations, and – as resources allow – to measure the Availability of additional digital press models.

THE *spencerLAB* DIGITAL COLOR LABORATORY

The *spencerLAB* DIGITAL COLOR LABORATORY is an independent printer evaluation laboratory that provides services to vendors and corporations for whom digital color printing is mission-critical. The Laboratory follows strict guidelines in the integrity of both methodology and reporting; vendor-sponsored studies do not guarantee favorable results. *SpencerLAB* has developed industry-standard test software, and performs print quality, cost-per-page, speed, and ease-of-use analyses in all technology classes, from desktop printers to digital color presses.

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PERFORMANCE TESTED

* Updated to include results of HP Indigo 7500 testing.
† Updated to include results of HP Indigo 7600 testing.