



WHITE PAPER

By the numbers: How EFI Nozomi technology expands capacity and boosts profitability

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EXECUTIVE SUMMARY:

Adding an EFI Nozomi LED digital printer to the shop floor generates extra analogue capacity

The following is a real case study that demonstrates – by the numbers – how adding an EFI™ Nozomi 14000 LED digital industrial printer to a corrugated packaging plant expands total manufacturing capacity.

This in-depth analysis was conducted at a real converting plant and demonstrates that investing in digital technology adds capabilities and extra flexibility by:

- Allocating jobs to the equipment that produces high quality graphics more efficiently – based on the characteristics of each order
- Leveraging existing analogue capacity without the need to invest in new flexo presses as the only answer
- Maximising overall equipment effectiveness (OEE) and overall plant profitability
- Proving to be an attractive capital investment with rapid return on investment (ROI)

CUSTOMER PROFILE

Corrugator plant equipped with 8 flexo machines, 1-5 colours, 150M sqm total output produced per year

ANALYSIS

It has been made over 2 chosen flexo 4/5 colour printers (RDC) with a total output of 52M sqm per year

RESULTS

+42%

% Additional analogue capacity

+35M

Total capacity (sqm)

+3M

Potential revenue (Y)

<2 YEARS

Digital ROI

Single-pass digital printing technology can create a competitive edge for today's corrugated plants

Much has been said about how digital technology is helping corrugated packaging manufacturers respond to the challenges and opportunities being created by trends, such as e-commerce and increased demand for sustainable packaging.

In this regard, single-pass digital printing technology addresses the demanding needs of corrugated plants in terms of:

- Generating higher value-added products, which increase the average margin and help build customer loyalty
- Reducing manufacturing costs, which continue to be key in a highly competitive market
- Securing the available capacity essential to capturing demand and to respond to the relentless deadlines required by customers – all while optimising capacity

Today's realities add a strain to plant operations that the new EFI Nozomi digital printing technology can mitigate – by generating new total production capacity, while increasing productivity, and adding extra flexibility.

In the following, we will present a real case where the contributions of digital technology to a corrugated converting plant has been analysed from a cost perspective. The numbers will show definitive results in:

- Cost optimisation for all types of orders
- Increased overall profitability
- Extra capacity generated



Our data collection and analysis process

For this study, our customer discovery was thorough and quantifiable. Production data from a real converting plant was collected over a period of more than three months for further analysis:

- We measured the total volumes printed with each type of technology and compiled an average job profile for the plant
- With this data, we were able to analyse the appropriate order size to be printed with digital technology
- From this, we were able to calculate the impact of releasing orders from analogue equipment when switching to digital, both in terms of available capacity and profitability

CUSTOMER DISCOVERY

DATA COLLECTION

1. Total printed volume per facility
2. General capabilities of each piece of printing and converting equipment – flexo, litho, digital
3. Profile of average job produced per machine
4. Detailed breakdown of all jobs printed per machine (minimum of three months of data is preferred)

BUSINESS ANALYSIS

ASSESSMENT REPORT WILL IDENTIFY

1. Economic digital crossover point per machine
2. Detailed cost and capacity summary for volumes below the economic digital crossover point
3. Potential additional analogue and digital capacity
4. Potential revenue and profitability opportunity

BY THE NUMBERS WHITE PAPER

BUSINESS FIT			
	+++	++	+
PRINTING TECHNOLOGY	<ul style="list-style-type: none"> • Litho (outsourcing) • HQ flexo volume (>4C) • Digital volume • Standard flexo (<4C) 	<ul style="list-style-type: none"> • Litho (In house) • Lower % HQ flexo volume (>4C) • Higher % Standard flexo (<4C) 	<ul style="list-style-type: none"> • Low % HQ flexo volume • High % Standard flexo (<4C)
CONVERTING EQUIPMENT	<ul style="list-style-type: none"> • Multiple flatbed die-cutters • Printing + RDC • FG or gluers (no printing) • Laminator • FFG 	<ul style="list-style-type: none"> • Flatbed die-cutters • Printing + RDC • Laminator in corrugator • FFG 	<ul style="list-style-type: none"> • Printing + RDC • FFG
MATERIALS	<ul style="list-style-type: none"> • Litho boards • Higher % Coated vs Kemi • White test liners • Brown test liners 	<ul style="list-style-type: none"> • Litho boards • Similar % Coated and Kemi • White test liners • Brown test liners 	<ul style="list-style-type: none"> • Lower % Coated vs Kemi • White test liners • Greater % of Brown test liners

Our methodology can be applied to any corrugated packaging company and its plants. We can identify the profile in which the impact of incorporating single-pass digital inkjet printing technology will be the greatest. Thus, we can anticipate that in plants that do a lot of high-quality work where there are complex processes (flatbed die cutters, folder-glue) and different types of materials, digital printing will probably have a greater impact.

For plants that aren't currently manufacturing value-added packaging, digital printing technology should be considered because it's the most efficient way to add high-quality printing capabilities.

Data collection per machine including real-world measurements

As the chart below indicates, our analysis included the measurements that are critical to uptime, productivity, and throughput:

2021 ACTUALS	WA1	WA2	MA2
Type of machine	FFG Ward - Die cut	FFG Martin	FFG Ward
Process	Flexo + Die cut	flexo	flexo
Colours	4/2	3/3	5/5
Sqm/h (average)	1.071	825	4.504
Set up time (min)	28	32	23
Downtime (% HT)	53	52	57
N° orders	4.254	2.904	5.233
Total open hours	7.218	6.855	8.112
Planned hours	3.365	3.316	3.511
OEE	14%	19%	37%

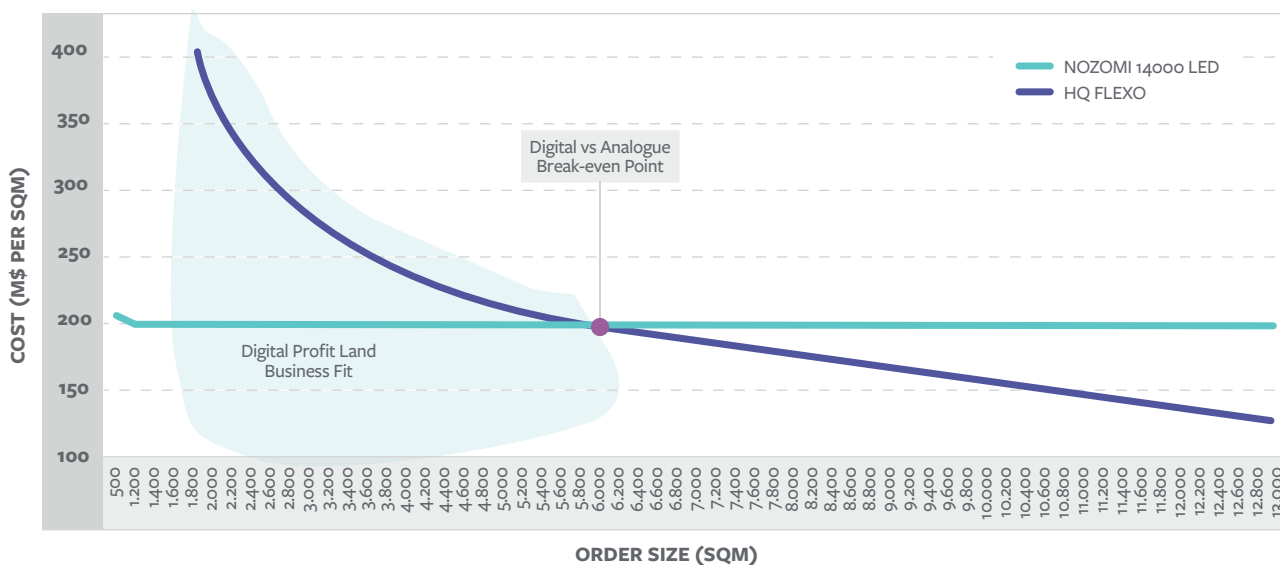
Total volume output (Y)	7.734.547	5.656.153	36.542.593
Total # sheets (Y)	5.969.580	7.981.408	18.237.030
Order average	1.818	1.948	6.983
Sqm/average	1,3	0,7	2,0

In this case, the customer decided to pick WA1 and MA2 machines. The first one is a clear candidate for optimisation as it shows medium to small order size on average, evident improvable OEE, and not very high production volumes. MA2 shows better ratios but still some margin of improvement.

The next step of the study consisted of calculating the break-even point to determine the average order size for which digital printing technology was more efficient and, above which, flexographic printing technology was more cost-effective.

The unit printing costs of the analysed presses (WA1 and MA2) and the unit costs of digital printing were compared. The average result sets the break-even point at 6,000 square metres. In other words, orders up to that amount were more profitable in digital printing than in high-quality flexo.

Savings generated from optimising digital and analogue printing reached over a million euros per year



The economic digital crossover point in the chart above was used in this analysis to calculate the savings generated from digital, as well as the extra capacity released from analogue. For this example, the complete box manufacturing process has been considered. More specifically, the following cost elements have been taken into consideration:

- Number of colours (cost of plates)
- Ink consumption
- Overall Equipment Efficiency (as it measures machine performance: print speeds, downtimes, quality issues, etc.)
- Labour cost
- Maintenance cost
- Depreciation
- Energy cost

After collecting data order-by-order for more than three months, we separated and grouped orders above and below the break-even point. Then we measured the direct savings from using digital where it is most efficient. These are savings or efficiencies generated by producing orders below 6,000 square metres with Nozomi 14000 LED digital printer instead of with the analogue equipment used until now.

Simply comparing printing costs of one technology to the other, we saw a saving up to 1,2€ million per year.

With Nozomi digital printing on the shop floor, analogue capacity increased by 42%

The chart below shows the extra profit directly generated from using the most efficient equipment to produce orders below 6,000 square metres.

COST EFFICIENCY / SAVINGS €							
Order Length	Volume (M sqm)	Total Volume (M sqm)	Waste (average)	N° of Colours	Analogue Cost €/K sqm	Digital Cost €/K sqm	Savings K€ Length (M)
1.000	0,4	12,1	6%	2	1.271	206	426
2.000	1,4		4%	2	454	199	357
3.000	1,8		4%	3	312	198	201
4.000	3,1		3%	3	248	198	159
5.000	3,1		3%	3	218	197	65
6.000	2,4		3%	3	198	197	1

COST EFFICIENCY / SAVINGS €			
M sqm	Colours	Waste (%)	Savings M€ (Y)
12,1	3	-6%	1,2

The chart below shows the extra capacity of the current analogue equipment (flexo HQ) that has been generated by transferring orders below 6,000 square metres to the Nozomi 14000 LED digital printer. To crunch the numbers, we have taken the average production times of analogue and digital manufacturing and the difference between them is the extra hours available.

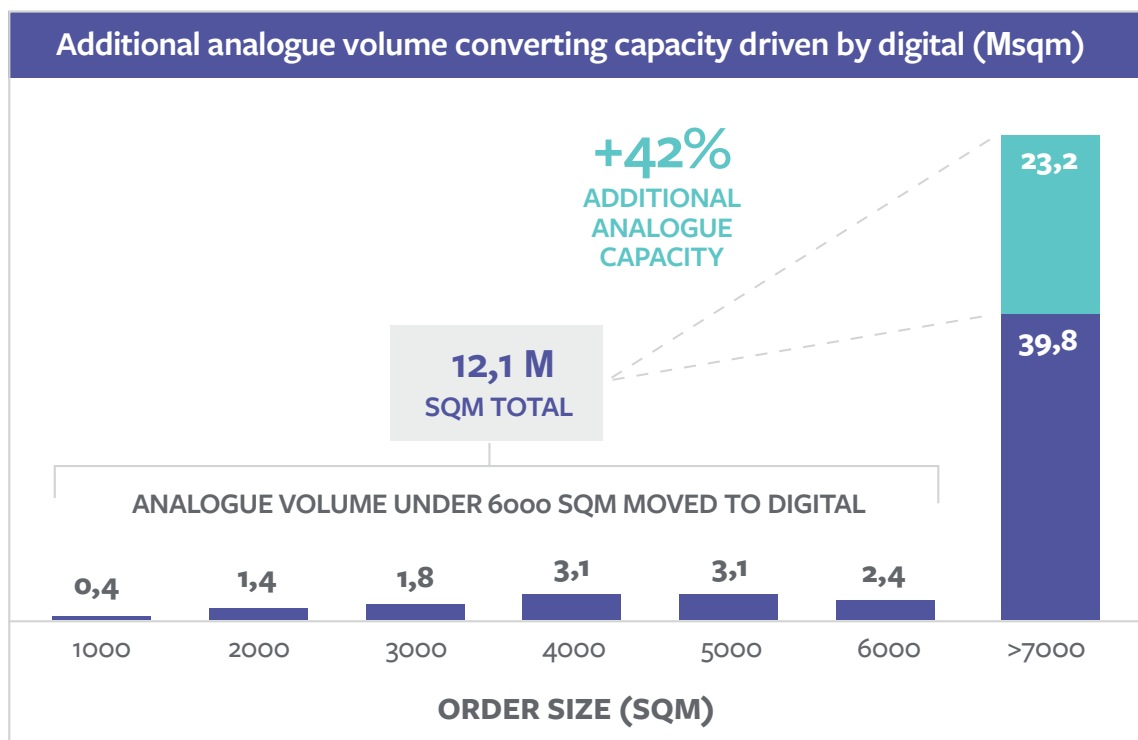
These extra hours can now be dedicated to orders above 7,000 square metres that have a productivity of 8,000 sqm/h resulting in an extra 23.2 million square metres.

FREE UP ANALOGUE CAPACITY/ NOZOMI BOOSTING CONVERTING EFFICIENCY				
Fexo Avg. Production time(h)	Flexo Speed Avg (sqm/h)	Digital production time (h)	Digital Speed Avg. (sqm/h)	Capacity Free-up (h)
0,86	817	0,28	2.540	217
1,24	1.228	0,52	2.938	865
1,38	1.723	0,74	3.212	1.026
1,06	3.317	0,96	3.669	944
1,27	3.473	1,18	3.737	885
1,43	3.823	1,36	4.020	617

These 2 analogue presses produce 40M sqm per year at an average speed of 8.232 sqm/h on orders over 7.000 sqm.

ADDITIONAL ANALOGUE CAPACITY GENERATED (Y)			
Hrs	M sqm	%	M€
4.560	23,2	+42%	+2,6 M

Putting it all together, the following chart illustrates how the analogue extra capacity generated, thanks to digital, represents an increase of 42% over the existing analogue capacity.



ROI analysis shows payback in less than two years

The last part of our analysis corresponds to the measurement of profitability. To estimate ROI, we have assumed a very conservative adoption of digital (25% equipment utilisation in the first year, reaching 100% only after 5 years) and a conservative margin of \$100/K square metre for analogue printing.

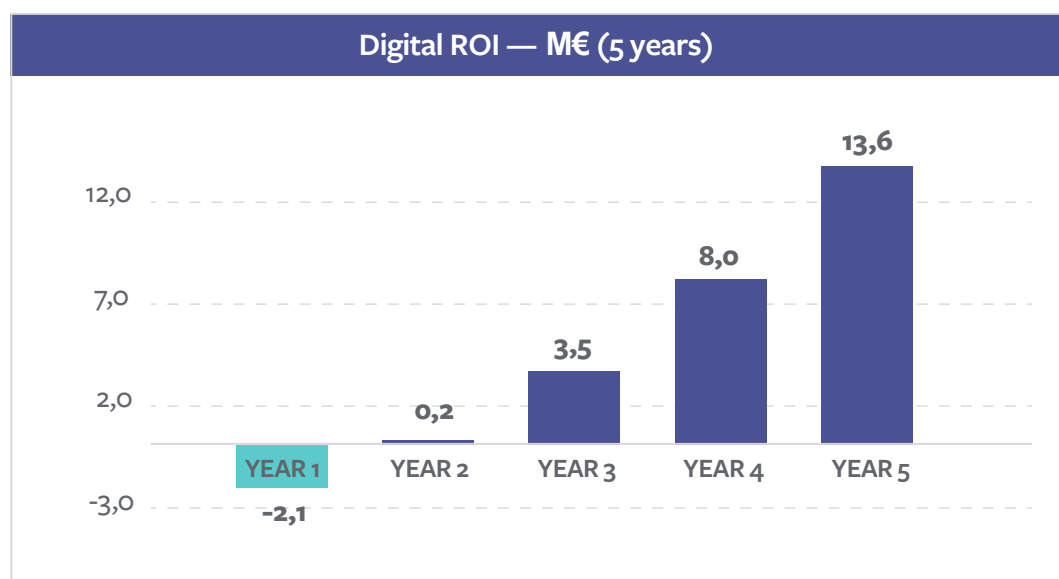
Total Nozomi capacity per year (K sqm) ¹	12.000				
Analogue free-up capacity free-up per year ¹	23.100				
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Total Nozomi output (K sqm) ²	3.000	4.800	7.200	9.600	12.000
Extra flexo output (K sqm) ²	6.250	10.000	15.000	20.000	25.000
Margin increase in orders under 6000 sqm thanks to Nozomi digital (Mill €)	0,8	1,2	1,9	2,5	3,1
Analogue gross margin of the extra capacity dedicated to orders over 6000 sqm (Mill €)	0,6	1,0	1,5	2,0	2,5
Total extra revenue (Mill €)	1,4	2,2	3,4	4,5	5,6
Simple pay-back (Mill €) ³	-2,1	0,1	3,5	8,0	13,63

1 Based on an adoption rate of 25% - 40% - 60% - 80% - 100%

2 Calculated on the total capacity of the equipment and its estimated conversion rate per year.

3 Simplified calculation that considers capital investment, but not other possible costs, such as financing or interests.

Pay-back of the Nozomi 14000 LED digital technology investment is completed in less than two years.



CONCLUSION:

The move to digital increases overall capacity, capabilities, profits, and OEE

Investing in an EFI Nozomi 14000 LED industrial digital printing solution is proven to generate efficiency and volume migration savings. And it does so with unprecedented flexibility because you can say yes to every job and produce each order with the most efficient technology every time.

In addition, digital printing technology has a proven ability to attract new business and increase margins with higher value-added products. Some examples are e-commerce boxes printed on the inside, point-of-sale displays with high quality graphics, versioned packaging for promotions, customised boxes for customers, and more.

The numbers prove that now is the time to move to digital printing technology with a robust, truly industrial solution such as EFI Nozomi 14000 LED industrial digital press.

Let's be brilliant. Together.

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