KEYPOINT INTELLIGENCE

SERVICE AREA:

Business Development Strategies

ANALYSIS

UNUSUAL SUBSTRATES

PRINTING CHALLENGES AND SOLUTIONS

APRIL 2023

contents

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Introduction

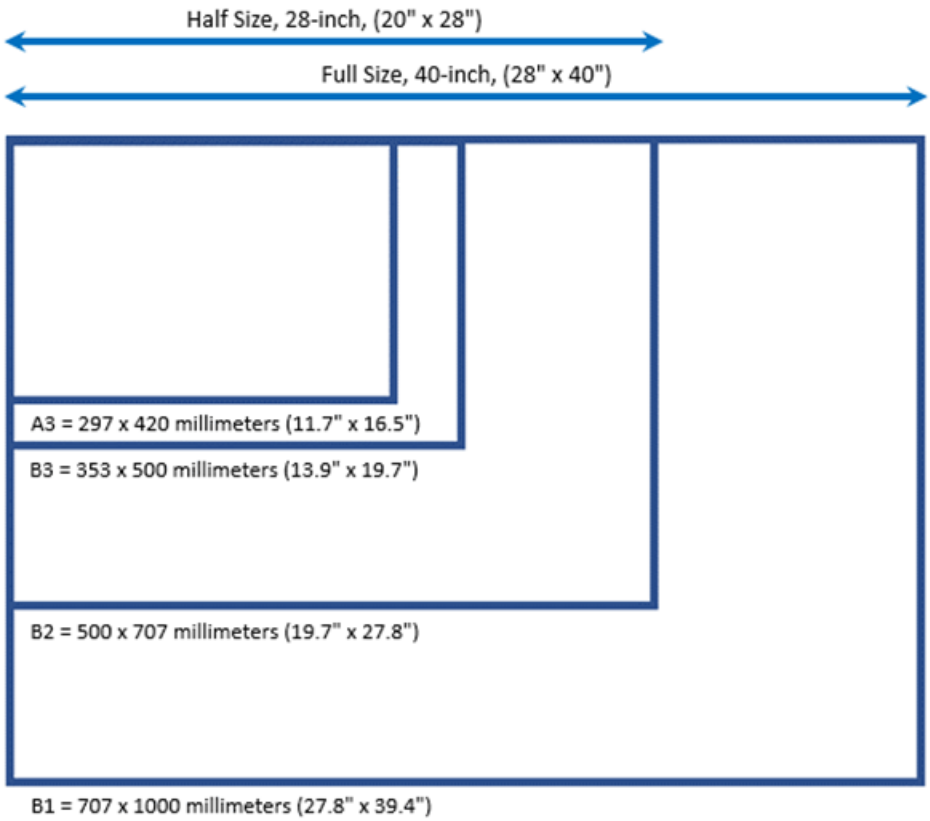
Print service providers (PSPs) are part of a very competitive market in which standard four-color output on commodity stocks can be had from online vendors at inexpensive prices. PSPs seeking to differentiate themselves while also meeting the needs of forward-thinking graphic designers must think beyond the ordinary. One way to do this is through the use of unusual or premium substrates. This document will explore a range of substrate options for document-oriented applications like those in general office, promotional, publishing, and transactional work. For the purposes of this paper, we will set aside packaging and wide-format applications (e.g., signage or banners), which each have their own universe of unusual substrates.

Paper Parameters

A few key parameters come into play with paper:

- **Format:** *What are the smallest and largest sheet sizes supported?* Sheet-fed offset presses are often referred to as Half Size or Full Size. These are much larger than the format of most digital printing systems, with the exception of newer B1- and B2-format models.

Figure 1: Standard Paper Formats



- **Weight:** *What are the lightest and heaviest weights supported?* Paper weight can be a particularly confusing topic due to the mix of terminologies. Grams per square inch is a consistent measure, but pound (lb.) weights in combination with various paper types (text, cover, tag, etc.) are also commonly used.

Table 1: Comparing Grams per Square Meter (gsm) to Lbs.

For Lighter Weights	For Heavier Weights
30 gsm = 20 lb. text	190 gsm = approx. 70 lb. cover
36 gsm = 24 lb. text	200 gsm = between 70 & 80 lb. cover
44 gsm = 30 lb. text	215 gsm = approx. 80 lb. cover
49 gsm = 33 lb. text	250 gsm = approx. 90 lb. cover
52 gsm = 35 lb. text	270 gsm = approx. 100 lb. cover
59 gsm = 40 lb. text	300 gsm = approx. 110 lb. cover
74 gsm = 50 lb. text	325 gsm = approx. 120 lb. cover
89 gsm = 60 lb. text	350 gsm = approx. 130 lb. cover
104 gsm = 70 lb. text	400 gsm = approx. 250 lb. tag
118 gsm = 80 lb. text	490 gsm = approx. 300 lb. tag

Note: Keep in mind that there can be variances depending on the specific paper type.

- **Thickness:** *What are the thinnest and thickest papers supported?* Paper thickness is typically measured in points. A point is equal to one one-thousandth of an inch. Thicker stocks in the range of 12 points and higher are used for applications like book covers, business cards, greeting cards, menus, pocket folders, postcards, and posters.

- **Finish:** Are there limitations on the system's ability to print on coated papers? For the purposes of this discussion, finish refers to the coating (or lack thereof) on the surface of the paper. As you would expect, uncoated paper doesn't have any coating. Common coated paper types include matte and gloss. The term "finish" may also refer to the texture of the paper, which may be smooth or rough (for example, the surface of a linen-textured paper resembles the pattern of a piece of cloth). A paper manufacturing process called "calendaring" results in a very smooth paper surface that somewhat resembles the glossy look of coated paper.

Printing Systems and Parameters

There are exceptions to every rule, but the Table below lays out some of the key parameters for commonly used production color digital printing systems and offset presses.

Table 2: Paper Parameters for Commonly Used Color Printing Systems

System Type	Feed Type	Technology	Parameters
Digital print (A3+)	Cut-sheet	Toner	*Format:* Maximum size is 11" x 17" or higher, often 14" x 20"; many systems allow long sheets *Weight:* Ranges from ~60 gsm to 350-400 gsm (though optional features may increase this) *Thickness:* Often maxes out at ~18 points (optional features may increase this as high as 24 points) *Finish:* Typically handles coatings well
Digital print (A3+)	Cut-sheet	Inkjet	*Format:* Approximately 14" x 20" *Weight:* Approximately 60 to 270-300 gsm *Thickness:* Up to ~18 points *Finish:* May require pre-treatments or special papers to support coated stocks
Digital print	Roll-fed	Inkjet	*Format:* Typically a 20" web width, though some systems offer wider web support *Weight:* Approximately 40-60 to 160-250 gsm *Thickness:* Up to ~16-18 points *Finish:* May require pre-treatments or special papers to support coated stocks
Digital print	Roll-fed	Toner	*Format:* 20" web width *Weight:* Approximately 40 to 350 gsm *Thickness:* Up to ~16-18 points *Finish:* Typically handles coatings well
Offset press (half size)	Sheet-fed	Lithography	*Format:* Around 20" by 28" *Weight:* Broad range of weights supported *Thickness:* Up to ~24 point (higher with options) *Finish:* Handles coatings well
Offset press (full size)	Sheet-fed	Lithography	*Format:* Around 28" x 40" *Weight:* Broad range of weights supported *Thickness:* Up to 24 point (higher with options) *Finish:* Handles coatings well

Note: This table focuses on systems primarily intended for document-oriented applications. It does not include devices used for wide-format display graphic applications.

In general, we can conclude the following:

- **Support for coated papers:** When new printing technologies are introduced, it generally takes time for them to support a broad range of paper types. Offset lithography, having been around for many decades, is well along the path of cooperation with paper vendors. Production color toner printing technologies, which have been around since the early 1990s, have also had three decades to adjust. Production color inkjet printing technologies are more recent, and while printing on uncoated stocks has not presented much of a challenge, they have needed paper

pre-treatments, special paper stocks, and/or advanced drying systems to be able to handle high-coverage print jobs on coated stocks.

- **Support for lower and higher weight substrates:** Roll-fed digital printing systems can typically handle lower paper weights well. This stems from their ability to tightly control the movement of the paper. By the same token, these systems typically are not able to handle heavier weights that some cut-sheet or sheet-fed devices can.

- **Expanding beyond A3+ format:** PSPs wanting to use cut-sheet color digital printing systems have been limited to formats in the range of 12" x 18" for quite some time. This has begun to change with the relatively recent introduction of B1- and B2-format cut-sheet color digital printing systems as well as extended sheet length capability.

- **Optional features:** Printing system vendors listening to the needs of their customers will often create features that extend the specifications of their devices. For example, we see options that enable systems of various types to support lighter or heavier papers, or, in the case of cut-sheet digital devices, allow the printing of long sheets for applications like wrap-around book covers and multi-panel brochures.

Substrate Categories to Consider

Unusual substrates often fall at the high and low ends of a printing system's specifications.

For example:

- **Heavier weights:** Support for heavy papers is important for applications like book covers and pocket folders, which may also push the boundaries of format for some devices. Many devices may not be able to accommodate weights above 350 gsm.

- **Lighter weights:** Support for light papers (in the range of 40 to 60 gsm) is particularly important for book publishing and mailing applications where the cumulative weight of multiple pages has implications for ease of use and mailing cost.

- **Extended format:** The ability of some digital devices to produce long sheets opens up possibilities for book covers, printing multi-panel brochures, and pocket folders.

- **Coatings:** Matte, gloss, and UV coatings can present a challenge for printing systems because they form a layer that may make it difficult for inks or toners to adhere.

Other papers may be unusual in some other fashion:

- **Color:** Naturally, not all papers are bright white or even off white or cream. The use of tinted or colored paper can add interesting design questions that must be resolved. Printing systems that offer white ink or toner in addition to the standard cyan, magenta, yellow, and black (CMYK) open up the possibility of using white as an underprint to enable reproduction of photographic images. Without white, there are still many design possibilities, though they often require a more limited palette.

- **Fine art papers:** The uneven surfaces of some premium papers like linens or watercolor papers require that ink or toner be laid down evenly for good results. Non-contact printing technologies like inkjet may have an advantage on suitable substrates compared to contact technologies like electrophotography or offset lithography.

- **Pre-perforated and scored papers:** Some finishing processes may be accomplished ahead of time through the use of substrates that have already been perforated or scored to make folds or tear-out sections for applications like coupons, greeting cards, and table tents. As is the case with uneven surfaces, you need to know whether your printing system will be able to handle this.

- **Smart and special papers:** Embedding markers into a substrate enables uses beyond a paper's typical capabilities. This may include radio-frequency identification (RFID) tags that offer interactivity with a consumer or embedded anti-counterfeiting markers for applications like identify badges or printed tickets.

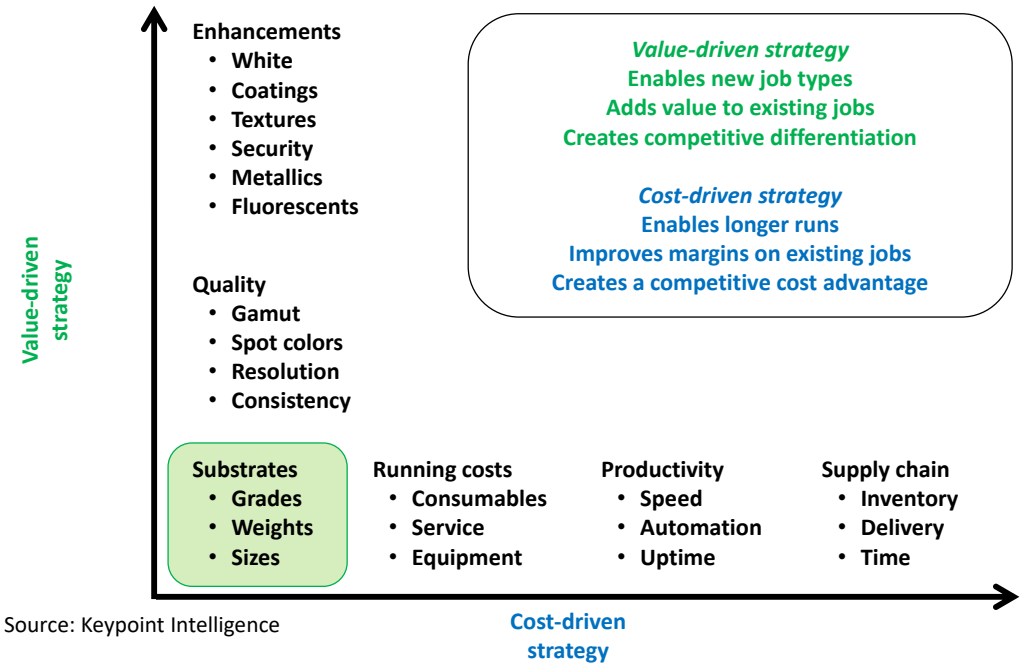
- **Synthetic papers:** Synthetic papers like Dupont's Tyvek are well suited for applications like maps, menus, report covers, signs, and tags where water-resistance, tear resistance, and dimensional stability are key. Substrates like this also offer an alternative to lamination.

Close cooperation with your printing vendor and your system vendor's paper testing lab can help you decide whether a substrate that is pushing the boundaries of a printing system's specifications can really be run effectively on your device.

Paper's Role in PSPs' Strategies

You might recall this graphic from the May 2021 Keypoint Intelligence white paper entitled *Marketing and Selling CMYK+: Challenges and Rewards,* which we have adapted slightly for this piece. It compares value- and cost-driven strategies. Paper is the starting point for both value- and cost-driven strategies.

Figure 2: Value-Driven and Cost-Driven Strategies



Source: Keypoint Intelligence

In a value-driven strategy, the focus is on providing customers with a wide range of products and capabilities. This often starts with an extensive substrate selection and typically follows a higher quality path that may include print enhancements. A value-driven strategy includes expanded product offerings that enable new jobs (and customers) and technological enhancements that add value to the jobs that are already being produced. A value-driven strategy is one way for PSPs to differentiate themselves from competitors.

In a cost-driven strategy, the starting point is once again in substrate selection, but it will likely be limited. Running costs are controlled tightly and the focus is on worker productivity, workflow automation, and high levels of uptime. Anything that can be done to reduce costs in the supply chain is also key. Overall, cost-driven strategies help PSPs produce effective and economic long runs and improve their profit margins on the kinds of jobs that are done repeatedly. In a cost-driven strategy, the competitive advantage is not in being the most innovative or creative PSP, but in being the most cost-effective one.

The Bottom Line

opinion

Remember the PLATE acronym? We wrote about it in the August 2022 white paper entitled *Print and Paper: Promoting the Advantages.* Each of the PLATE attributes (Physical, Lasting, Accessible, Tactile, and Eco-Friendly) apply directly to paper's key role in print production.

Figure 3: The PLATE Acronym

Source: Keypoint Intelligence

Ultimately, differentiation is key—but how you choose to differentiate will depend on your overall capabilities and your company's short- and long-term strategies. The selection of substrates that a PSP offers can provide a revealing insight into the kind of printer they are trying to be. Don't lose sight of paper's role as a differentiating factor in the value of print!

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Comments or Questions?