Paper Cost

approximately 30–40% of your printing job is the cost of paper

larger jobs such as magazines or manuals, can be as high as 50%
Fox River Paper Rippon Plant
Raw Materials

Paper can be made from any fiber that bonds together when wet. Wood, cotton, wheat, hemp, rice, old paper, beer hops, banana plants, kenaf, plastic and grass clippings. Paper that is made with long cotton fibers is durable and smooth.
Raw Materials

most papers are still made from wood
fiber from softwood trees such as pine are long and make strong, relatively rough papers
hardwoods such as maple, produce short fiber weaker papers that are relatively smoother
commercial papers usually contain a blend
How paper is made

diagram: “Getting it Printed” by Mark Beach
Paper Categories

**groundwood**: made from grinding up wood chips, which leaves the lignin, or brownish organic compound that binds the loose fibers together in trees, in the pulp. Lignin adds opacity but also reduces the whiteness and brightness.

*ex: newsprint and tissue*
Paper Categories

**free sheets:** chipping the wood and treating it with chemicals to remove the lignin and bleaching agents resulting in smoother and brighter papers. Most printing and writing papers are free sheets.

colored papers are also free sheets b/c the pulp is bleached before the dyes are added
How paper is made

diagram: “Getting it Printed” by Mark Beach
Characteristics

Types of paper
Finish: Coated/Uncoated
Grain
Opacity
Thickness
Strength
Color
Brightness
Basis Weight
# Types of Paper

<table>
<thead>
<tr>
<th>Types of paper</th>
<th>Finish</th>
<th>Grain</th>
<th>Opacity</th>
<th>Thickness</th>
<th>Strength</th>
<th>Color</th>
<th>Brightness</th>
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</thead>
<tbody>
<tr>
<td>bond: letterhead, laser paper</td>
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<td>text: high quality posters, brochures</td>
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<td>uncoated book: books, newsletters</td>
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<tr>
<td>coated book: magazines, catalogs, calendars</td>
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<td>cover: covers, posters, reply cards</td>
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<td>board: displays, folders, covers</td>
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Finish

Types of paper
Finish
Grain
Opacity
Thickness
Strength
Color
Brightness
Basis Weight

the way paper is surfaced (smooth or rough)

smooth finishes reproduce with better detail and accurate color
smooth paper reflects the light more directly, without scattering.
smooth finishes are applied by calendaring or coatings

**calendering:** process in which uncoated paper is polished and smoothed by running through close-stacked metal rollers at the end of the paper making process.
Finish

rough finishes scatter light: images are fuzzier and colors, especially solids are muted

rough finishes can come in grids, lines or pebbling can create interesting effects, but get samples (drawdowns)

type with fine lines may break up and halftones may “plug up”

rough paper also causes dot-gain, where the dots of ink spread out as they are absorbed into the paper
Coating

coating refers to chemicals applied to a paper’s surface to smooth it out
white coated papers reproduce color best:
ink stays above coating and does not absorb into the paper matrix
as a cost saving alternative to coated paper, use calendared paper
example: sunday supplements
## Gloss

shine or reflective properties of the paper’s surface

gloss is relative to the amount of polishing or chemical applied to the paper
dull: a wash is applied to the paper to seal it.
ink stays on top of the paper and doesn’t sink

other gloss options: **matte, suede or velvet, gloss, ultragloss and cast-coated**

with each level of gloss, light is reflected more uniformly and better ink hold-out

for design jobs with a lot of color and text, choose a dull or a matte
during paper making, most fibers are oriented with their length parallel to the paper machine (machine direction) and their width running across the machine (cross direction)
Grain

folds smooth with the grain

cracks and roughens against the grain

stiffer in the grain direction

expands and contracts in the cross direction when exposed to moisture

in books and catalogs, grain direction should be parallel with the binding edge

test: paper tears straighter and folds easier with the grain
amount of light blocked by paper
sometimes referred to as show-through
papers with a high opacity do not let much light shine through, printing on the other side does not show through
Opacity

Types of paper
Finish
Grain

More Opaque
thick paper
groundwood paper
coated paper
rough-finished paper
dark-colored paper

More Show-Through
Thin paper
Free sheets
Uncoated paper
Smooth-finished paper
White or light-colored paper

Strength
Color
Brightness
Basis Weight
Thickness: Caliper

caliper is the thickness of a single sheet of paper measured in points

1/1000 of an inch for paper
1/72 of an inch for type

groundwood paper = thicker, free sheets = thinner

some very heavy papers are measured in ply;
ply varies from mill to mill and is not an exact measurement, rather it is the number of sheets of paper laminated together
Strength

strength best determined by printer/paper merchant/mill
indicate project usage on a RFQ, this will guide recommendations
two categories of strength: internal and external
**Internal**

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- **Mullen strength**: helps paper resists bursting, important if a paper is going to be punctured ex: stapled, hole punched, perforated or wire or comb bound

- **Tear strength**: how well a paper resists tearing. very important for packaging, especially bags and web papers as they are drawn along a press

- **Tensile strength**: how much a paper resists stretching

- **Bond strength**: keeps paper fibers bonded together. important in web papers which endure a lot of stress going through drying ovens
External

**pick strength:** allows paper to resist the tendency of sticky ink to pull off pieces of coating and fiber. Important with color work

**coating strength:** how the paper resists delamination, or the pulling away of the coating from the paper. Delamination results in blisters
color is achieved by the use of dyes and bleaches added to paper to produce different hues.

When choosing a colored paper, always request printed samples since the color of the paper affects the color of the ink b/c most offset inks are transparent.

White paper is the best paper for color printing.
if you use a white paper, all of the red and all of the blue light are reflected back through the magenta ink and we see the pure magenta on cream or off-white paper, all of the red is reflected back through the magenta ink, but only some of the blue. thus giving off a reddish-orange cast, images appear “warmer”
The reflectivity of paper for a specified blue light measured under standard conditions, on an instrument (brightness meter) calibrated and designed for this purpose. In paper, is the amount of light, diffusely reflected from a surface, compared to that which would be reflected from a block of bright Magnesium Oxide; measurement is made with a specific wave length of light (blue), with the surface of an opaque pad of paper being illuminated at a 45 degree angle and the reflection being measured at a 90 degree angle; the human eye sees only reflected light, and brightness influences printed contrast and the amount of illuminating light which is reflected.
Brightness

summary: how white the paper appears

American Forest and Paper Institute sets brightness standards industry-wide: labels sheets #1–5 according to testing results

#1 sheets are brightest, highest quality and usually more expensive
Basis Weight

basis weight is the number of pounds of 500 sheets, or a ream

different types (such as text) of paper are measured in different sizes, so it is hard to compare between the two

each type, however, has a standard size, so the weight will not vary within a specific type

ex: text or book papers measure 24” x 36”
cover papers measure 20” x 26”