

What Was Old Is Now New: Recycled Papers

Have you ever considered the profound effect the invention of paper has had on society? Paper made ideas portable, enabled the sharing of discoveries and inventions, and changed human history from oral to written. Literature, art, education, and communication were all accelerated by the invention of paper.

The technology for making paper as we know it today from the cellulose fibers of wood wasn't developed until the mid-1800s. Originally natural materials like silk, parchment (the skin of a sheep or goat), or vellum (fine parchment made from the skins of calves, lambs or kids) was used as paper.

Following Gutenberg's invention of movable type and improvement of the printing press, new papermaking technology was developed based on the fibers from linen rags. The appearance of newspapers in the late 1600s and early 1700s created a severe shortage of rags that led eventually to substituting wood for the fibers in paper. The process was fully developed toward the end of the 19th century.

The ancient roots of recycling in papermaking

The invention of paper is usually attributed to Ts'ai Lun, an official in the Chinese royal court, in A.D. 105. He recycled rags, used fishing nets, hemp and China grass to create a substitute material for silk which was the predominant writing material of the time. The next development in papermaking was also based on recycling, using rags and old clothes to make paper.

Use of virgin materials vs. recycling

Throughout the 20th century, when trees were considered to be an endless supply, most paper was made using trees cut from forested land. Today wood fiber is still the predominant material in paper, though it comes from different sources. Paper



companies grow trees on farms specifically for use in papermaking; and wood fibers are recycled from post consumer waste. In fact, since 1993 more paper has been recycled than put into landfills. This has helped increase the supply of waste paper available for re-use in papermaking, and has also reduced the costs of recycling.

Recycled paper: is it good as new?

In the early 1980s when recycled papers were being developed, they were hard to use on press and in copiers. Besides jamming and not always receiving ink evenly, there were problems with linting, dusting, and picking (the tendency of the ink to pick fibers from the surface of the paper). Today, however, recycled paper performs quite well though there may be some minor aesthetic issues (such as lower brightness than virgin paper). On the other hand, recycled papers may have higher opacity (meaning they are harder to see through) which is an asset for two-sided printing.

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Selecting a recycled paper

When selecting paper for a project, please let us know if you would like to use a recycled stock. A good selection of papers are available with up to 30% post consumer recycled content; for higher content, your choices may be more limited, especially if you wish to use 100% post consumer recycled paper.

The characteristics of paper that are important for your project are its surface appearance and strength. The surface appearance affects how the ink or toner will lay on the paper surface; how light reflecting from the paper will interact with the ink color; whether the sheet will conceal print on the reverse side; and how the paper feels when touched. The strength of the paper is especially important when there are post press operations like folding or binding or when the printed piece will be handled a lot.

Paper surface

Smoothness: this characteristic describes paper surface qualities that are important for image appearance and printability and is a function of the calendaring process in the final stage of papermaking. Increased calendaring results in a smoother, glossier sheet of uniform thickness with less opacity and brightness.

Brightness: the brightness of a paper measures the percentage of light it reflects which in turn controls readability. A high brightness provides the greatest contrast but can contribute to eye strain. A low brightness provides less contrast but can produce a blurring effect. Brightness is a characteristic mainly applicable to white paper grades.

Opacity: the degree to which a sheet conceals print on its reverse side, opacity is influenced by basis weight, brightness, and the type of fiber and filler added to the wood pulp.

Finish: the surface of the paper can be coated with a clay-like substance then calendared to produce an extremely smooth sheet with excellent ink holdout properties. Coated sheets are often used when printing in full color, especially for brochures, sell sheets, and similar marketing materials. Alternately, a finish may be added to paper during the manufacturing process. Common finishes for writing and book papers are felt, laid, cockle, antique, eggshell, vellum, smooth and lustre. Yet other finishes are embossed on the surface of the paper after manufacturing is complete. Popular embossing patterns are linen, tweed, and pebble.

Color: for full color printing, white is the most popular color, though how white the sheet appears is affected by its brightness. Bright whites accentuate the contrast between light and dark while off whites produce less glare. For colors other than white, the paper color may affect the perception of ink color.

Paper Strength

Formation: formation is the physical distribution of fibers and solid additives in the sheet which can often be observed by holding the sheet up to light. A poorly formed sheet is one in which the fibers are unevenly distributed; this can cause ink to absorb at different rates and create a mottled appearance.

Grain: the direction in which most fibers of the paper align is called the grain. Paper is more flexible along the grain and stiffer against it. The test for grain direction is to tear the paper. It will tear easily with the grain and crack or create a ragged edge against the grain. Paper should always be folded and bound with the grain. Recycled paper is less apt than virgin paper to crack when folded against the grain, because the fibers are shorter and the bond not as strong.

Caliper: caliper is the thickness of the paper, measured in thousandths of an inch. Printers often refer to this measurement as a *point* and will describe a paper measuring .012 inches thick as "12 point".

Weight: the weight in pounds of one ream (500 sheets) of the paper's grade size. Weight is often confused as describing the thickness of a paper; however, a thick small-sized paper may have a basis weight identical to that of a large, thinner paper. For example the basic size for bond paper is 17 x 22 inches. If 500 sheets of bond in its basic size weighs 20 pounds, it is classified as 20 lb. bond. However, if it weighed 24 pounds it would be called 24 lb. bond.

Bulk: the thickness of a paper relative to its basis weight. An uncalendared uncoated paper has a higher bulk than gloss coated paper. Bulk does not predict basis weight.

Got questions? we're here to help

We know paper characteristics can be confusing, and made more so when selecting recycled sheets.



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