

## Straw Pulp Uses in Papermaking

By **Robert W. Hurter**, P.Eng., MBA, President,  
**HurterConsult Incorporated**. Extracted from  
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Generally, nonwood plant fiber pulps can be grouped into two broad categories:

- common nonwoods or hardwood substitutes such as **cereal straws**, sugarcane bagasse, bamboo (shorter fiber species), reeds and grasses, esparto, kenaf (whole stalk or core fiber), corn stalks, sorghum stalks etc.
- specialty nonwoods or softwood substitutes such as cotton staple and linters; flax, hemp and kenaf bast fibers; sisal; abaca; bamboo (longer fiber species); hesperaloe etc.

As with wood, there are differing chemical and physical properties within the two groups depending on the nonwood fiber raw material (see **Nonwood Plant Fiber Characteristics**).

Of the common nonwood fibers, **cereal straws** are the most widely available and the most widely used in the production of pulp and paper. Typically, **cereal straw pulp** is produced in integrated pulp and paper mills, and softwood kraft or sulfite pulp is added to provide the strength requirements to the paper. However, specialty nonwood pulp may be used instead of softwood kraft or sulfite pulp thus producing a 100% nonwood paper. The possible combinations are endless and can be adjusted to meet market requirements.

Furthermore, it is possible to add small quantities (up to 20 - 30%) of **cereal straw pulp** to primarily woodpulp-based papers without impairing paper properties or paper machine runnability. This provides wood-based mills which are hardwood deficient but located within a region with available **cereal straw** resources with the option of adding-on a straw pulping line to supplement their fiber requirements.

The following table provides some uses for **cereal straw pulps** in papermaking. It is by no means complete as many other products could be added to the table. Rather this table provides an indication of the many possibilities which are available for the use of **cereal straw fiber** in papermaking. When reviewing this table, please note:

- The cereal straw pulp in the furnish is chemical pulp unless noted otherwise.
- The long fiber pulp typically would be kraft or sulfite chemical pulp (or a mixture of the two) made from softwoods, and bleached, semi-bleached or unbleached depending on the type of paper or paperboard. However, it is possible that one of the specialty nonwood fiber pulps could be used instead of softwood.

<b>Straw Pulp and Long Fiber Virgin Woodpulp</b>			
<b>Type of Paper</b>	<b>Straw (%)</b>	<b>Long Fiber Pulp (%)</b>	<b>Quality</b>
Bond papers	75 - 85	15 - 25	very good
Bristol boards	90 - 100	0 - 10	excellent
Corrugating medium	90	10	excellent
Glassine	90 - 100	0 - 10	very good
Greaseproof	90 - 100	0 - 10	very good
Lightweight MG wrapping <sup>(1)</sup>	50 - 60	40 - 50	good
Strawboard	100	0	good
Waxing papers	50 - 60	40 - 50	good
Woodfree printing papers	85 - 90	10 - 15	very good
Woodfree writing papers	85 - 90	10 - 15	very good
<b>Straw Pulp and Wastepaper <sup>(2)</sup></b>			
<b>Type of Paper</b>	<b>Straw (%)</b>	<b>Wastepaper (%)</b>	<b>Quality</b>
Chipboard	50 - 80	20 - 50	good
Coarse wrapping	50 - 60	40 - 50	acceptable
Corrugating medium	70 - 80	20 - 30	good
Folder	50 - 70	30 - 50	acceptable
Test liner	50 - 60	40 - 50	acceptable
Notes: (1) Bleached or unbleached. (2) May require up to 10% virgin pulp for runnability depending on wastepaper quality and machine speed.			