

Market Pulp - Systematic Evaluation

Revitalizing U.S. Market Pulp Business: Demonstrating Paths to Success

Summary

Objectives are to:

- Provide systematic market trend analysis of the market pulp industry
- Provide an objective database containing properties of fibers used in market pulps
- Deliver a value-oriented tool appropriate for economical pulp selection

Approach includes delineating trends in the market pulp industry, identifying pulp buyer and seller needs, and developing a comprehensive database of major market pulps from domestic and international sources. This project is 45% complete.

Key Questions

- ▶ How can we develop an objective, value-oriented framework for evaluating market pulps?
- ▶ How can we encourage high performance, highly profitable product development by specialty paper producers?

Key Results to Date

The global market for Market Pulps exceeds 39 million tons involving over 35 producing companies in 22 countries. Pulp buyers continue to use pulps with somewhat empirical selection criteria resulting in non-optimal furnish selection from an economic standpoint. Pulps are generally selected on the basis of price and less on their benefits and distinctive properties. There is need for knowledge as well as a framework that enables both buyers and sellers of market pulps to make cost-benefit tradeoffs when evaluating substitute pulps.

Market pulps are used in widely varying amounts in many key paper grades. For example, Northern Bleached Softwood kraft

Value Proposition

By systematically evaluating key marketing, production, and technical aspects of market pulps and incorporating these results into an objective, accessible format, a tool can be provided to aid in market pulp selection. . Key parameters like fiber strength and coarseness can vary by as much as 35-50% between selected market pulps, offering potential for significant economic gains when pulp selection criteria are available.

(NBSK) market pulps - used primarily as reinforcement fiber in paper grades such as newsprint, supercalendered (SC), coated mechanical fiber (LWC, MWC and HWC), coated freesheet, specialties and tissue, towel and napkin - are used at levels ranging from as low as several percent in some news grades to approximately 35 % in ultra lightweight coated (ULWC) papers, coated freesheet and tissue, towel and napkin grades, and up to 100% in some specialty grades. NBSK provides a long, strong fiber network to increase wet web strength and runnability on the paper machine, printing and other converting operations.

Market pulps also use a variety of wood species. For example, the wood species used in bleached hardwood kraft (BHK) market pulps range from 100 % aspen, maple or birch to mixed Northern or Southern hardwoods and 100 % eucalyptus. BHK pulps are used primarily for their ability to provide better formation, smoother surfaces, finer pore structures and higher opacity. In tissue and napkins, they provide softness and a velvety surface feel. They are used in most paper grades, except mechanical fiber papers, at typical levels of 50 to 80 % of the fiber furnish ,

with some grades comprising 100% market pulp.

Market pulps are classified into various categories based on the type of fiber, pulping process and degree of bleaching. This often leads to pulps in a category (NBSK, for example) being treated as a commodity. On closer examination of market pulps of a certain category – e.g., Canadian NBSK pulps - one finds that there is considerable difference in fiber morphology and performance capabilities, as indicate below Button (2003)):

- Fiber strength is 35 % higher for the strongest fiber pulps compared to the lowest.
- Net refining energy is as much as 50 % less for the best pulp to reach the same high level of fracture toughness; at that fracture toughness, tear values can be as a much as 68 % higher and tensile strength nearly 19 % higher for the highest versus the lowest.
- In the area of fiber morphology, coarseness of the finest fiber pulps is 29 % lower than the coarsest.
- The ratio of fiber length to coarseness, a key predictor of tissue softness, is nearly 45 % better for the highest ratio compared to the lowest.

Also, controlled handsheet studies showed that the type of fines (chemical versus semichemical versus mechanical) had a significant effect on sheet tensile and scattering, at constant overall fines level (Retulainen, (1996b)). Fiber length, coarseness, and strength were also shown to have relatively high potential impact on sheet tensile and tear properties (Retulainen, (1996a)).

Depending on the particular paper grade and process capabilities, as the above information indicates, it is possible to make significant improvements in product performance by selecting the best NBSK from the "commodity" pulps available in the marketplace. Market pulp fiber property information and other parameters (discussed below) can be used as inputs into optimal economic pulp selection for sheet property development.

To take full advantage of the unique properties of market pulps, an objective data base is needed which would include:

- Pulp type and properties related to end use, e.g., opacity, softness, bulk, etc.
- Production and marketing information of importance to a pulp buyer, e.g., supplier capacity, cost structure, location, environmentally-friendly certification.
- Consolidation of the above information into an accessible framework

Work is underway to produce a practical, relevant "Market Pulp Resource Book" containing a detailed description of each fiber's distinctive properties, unusual attributes and most appropriate applications, as well as scanning electron micrographs for each of the major pulp species. Plans are to make this resource book available to pulp buyers, pulp sellers, R&D groups and academia. This database will contain over sixty different market pulps/fiber species from all over the world. The data base includes:

- Softwoods (NBSK, SBSK, fluff, dissolving pulp, BCTMP, others)
- Hardwoods (NBHK, SBHK, BCTMP, others)
- Recycled PCW market deinked pulp
- Non-wood fibers (bagasse, kenaf, cotton, bamboo)

Where appropriate, pulps from different geographic regions of the U.S. and the rest of the world are included. For each pulp, key fiber and handsheet properties are being measured, including fiber length distribution, fines content, curl, and sheet tear-tensile relationship, bulk, brightness, and other properties.

In parallel with the above work on fiber and handsheet properties, work has been initiated to identify, summarize, and correlate other issues relevant to objective, economical pulp selection. This work includes

- A detailed literature review summarizing available information

relating fiber properties to end use performance

- Compilation of business-related parameters related to supply chain, manufacturing, and marketing issues, including supplier location, price, and capacity – using an interview/survey approach to supplement written information.
- Summary of the above findings and the fiber/sheet property work in an accessible Excel based format

Implications for Industry

A theoretical framework for evaluating the use of substitute pulps will provide the illustrative evidence necessary for educating pulp buyers of the importance of studying pulp attributes while selecting pulps. It will also increase the relevance of information regarding various properties of different pulps documented in the book to readers. Completion of this work is expected to stimulate new product development based on innovative market pulp utilization.

Anticipated Results and Implications

In addition the pulp resource book and the Excel-based substitute pulp evaluation

framework, a public seminar is planned in conjunction with publication.

Industry Involvement and Impact

Market pulp producers and purchasers and industry consultants are being contacted to provide input in key marketing and production areas.

Publications

None to date

References

- Button, A. F., Private Communication, December, 2003
- Retulainen, E., *Paperi Ja Puu* 78(4):187 (1996a).
- Retulainen, E., *Paperi Ja Puu* 78(5):305 (1996b).

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