

Conference offers diverse views of pulping advances

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The TAPPI 1991 Pulping Conference drew more than 1000 attendees to Orlando, FL, to hear talks on various pulping methods, pulp bleaching, and fiber supply the first week of November. A sampling of what they heard follows. Conference proceedings, published in two volumes, are available from TAPPI PRESS for US\$123 (members), and US\$185 (nonmembers), plus shipping. Order No. 01050691.

Perhaps the boldest concept to emerge at the 1991 Pulping Conference was the description of Beloit's new BelBrite "process" by Ethan K. "Andy" Andrews: do rapid displacement heating (RDH) pulping, then wash and bleach the cooked material while it's still in the digester! Andrews likened it to using a chip-filled digester as a wood chromatography column for a succession of pulping and bleaching chemicals.

One line-up of chemical treatments after pulping might be oxidized green liquor, peroxide (twice), and peroxyacetic acid. Preliminary lab-scale experiments indicate that it's not entirely a wild idea: how about pulp out of the digester at 40% yield, 8 kappa, and 52% brightness? Other tests showed that various combinations of peroxide and peroxyacetic acid on the pulp outside the digester could boost its brightness well into the 80s.

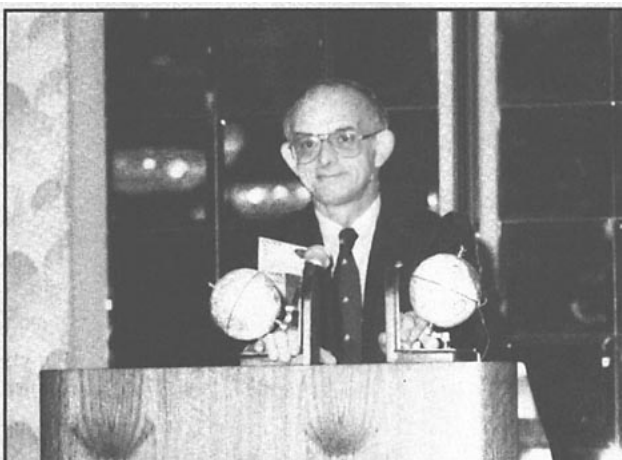
So, consider the possibilities: no brown stock washers, knotters, screens, oxygen delignification equipment, or even the front end of a bleach plant. But remember also the probable difficulties of achieving efficient delignification and bleaching chemistry in a voluminous bed of stationary material still largely in chip form.

It's an intriguing concept, with some monumental technical hurdles to leap.

Batch to the future

All three RDH batch kraft mills operating in the United States were represented at a roundtable session that might have been titled "RDH—the nuts and bolts of start-up." None of these mills—S.D. Warren at Westbrook, ME, Bowater at Calhoun, TN, or Willamette at Bennettsville, SC—had an easy start-up. This session focused on how they resolved the problems they faced.

In recognition of his term of office in the Pulp Manufacture Division Chairs, **William S. Fuller** was presented with a set of bookends.



Paul R. Ingraham of Bowater noted that his plant, now approaching 1000 short tons/day from eight digesters, is cooking to about 20 kappa on pine, which comprises 95% of the production at Calhoun.

Although good for delignification reasons, this overloads the recovery system by some 20% in black liquor solids. Steam consumption per ton of pulp is less than half that of a conventional batch operation, but remains twice the RDH design figure. Also, the terminal displacements before digester discharge take substantially longer than was projected.

A change in chip screening that improved fines removal has helped the operation considerably.

Last September, Bowater abandoned compressed air blowing of the digesters in favor of pump-out, using the design pioneered by Willamette at Bennettsville, SC. For all the current talk about very low kappa numbers, both of these mills have been down to the low teens on softwood unintentionally, and both are still trying to get back into

Wayne F. Carr, left, 1991 TAPPI Pulp Manufacture Division Leadership and Service Award and Joseph K. Perkins Prize recipient chats with Pulping Conference Keynote Speaker Carl A. Hammerschlag after the opening session.



Pulp Manufacture Division Chairman William S. Fuller, left, presents Walter J. Bublitz with the 1991 TAPPI Pulp Manufacture Division Medal and Johan C.F.C. Richter Prize.



the 20s for steady, controllable operations.

Bill G. Seamans provided useful information on how Willamette tackled such problems as hitting temperature targets and gaining control of the hot black liquor accumulators, installing enough headers to deliver the right liquors to the right digesters at the right times, and getting satisfactory performance from liquor pumps and heat exchangers.

The pulp mill, sized for 840 a.d. tons/day (bleached), was close to its 1991 budgeted tonnage, and pulp quality to the fine papers machine is described as excellent.

Roy Layton of S.D. Warren noted that minimizing the fines in the chip furnish is important in RDH operations. At his mill, chips are screened when they enter the mill site, and again before reaching the digesters.

Layton provided a perspective seldom heard from speakers at this conference, that of an operator and union member. He said that at Westbrook, training was a critical issue from Day 1. He and his fellow operators work in pairs, controlling the entire fiber line and switching responsibilities on alternating days. The four-digester plant is a mixed hardwood operation.

Organosolv pulping

Somewhat farther into the future are the variants of organosolv pulping. Even so, they commanded prominent space in the conference's program. Delegates heard the latest on Alcell, Organocell, and ASAM pulping.

Stephen R. Winner (Repap Technologies) described R&D work on nonwood fibers, materials which appear to respond well to aqueous ethanol pulping. Among wood sources, Alcell's viability remains restricted to hardwoods, so applications with nonwoods can broaden the range of the process, and might capitalize as well on its smaller-than-kraft scale.

Later, William R. Henry (Repap Ferrostaal) presented

an assessment of the nascent business of organosolv pulping. Not surprisingly, he concluded that it was entirely probable that Alcell and Organocell would succeed commercially, given their demonstrated progress to date.

The Organocell mill under construction in Kelheim, Germany, is due to start up in September 1992, making fully bleached pulp from spruce. Described until recently as a two-stage process, it is now envisioned as a single-stage soda-anthraquinone-methanol cook at process conditions ever closer to those of kraft pulping.

Alkaline pulping

Papers on the ASAM pulping process and Arkansas Kraft Mill's modified evaporator were well-received at the alkaline pulping session chaired by Arthur Boniface of Simons Eastern Consultants Inc. The ability to bleach pulps to high brightness without chlorine helps give the ASAM pulping process a significant environmental advantage over kraft pulping. Two additional steps are necessary for ASAM recovery: methanol recovery and the conversion of sodium sulfide to sodium sulfite. These are relatively simple steps for which commercial equipment is available. Evaporation, combustion, and causticizing can be carried out with the same equipment used in kraft recovery. The ASAM process offers superior environmental performance, while producing equal or better quality pulp.

Bruce Netherton presented a look at Arkansas Kraft Mill's modified black liquor evaporator and recovery boiler. The modifications made to the seven-body, quintuple effect evaporator permits continuous firing of 80% black liquor solids. The addition of an ultra-high solids concentrator has helped achieve a production increase, reduction in evaporator boilouts, and a lowering of the effluent BOD level.

1991 Pulping Conference Technical Program Chairman **Richard J. Spangenberg** addresses attendees during one of the meetings in Orlando, FL.



Hector J. Audette, left, receives a Certificate of Appreciation from TAPPI President **F. Keith Hall**. Audette was one of several Pulping committee chairmen recognized for their past efforts during the 1991 Pulping Conference.



Steam explosion and deinking

The first secondary fiber session, chaired by Daniel B. Mulligan of HNTB, featured papers on steam explosion technology and deinking wastepaper grades. John R. Mentz, Recoupe Recycling Technologies, introduced attendees to the "roots of the steam explosion process" and its use in deinking secondary fiber. A look at comparative results of steam explosion vs. conventional deinking methods show a reduction in tear factor and a higher burst value. The system can be installed in 6–9 months. Its easy operation lowers training and maintenance costs.

Kate Cathie of Pira International examined the deinkability of laser and xerographic nonimpact printed grades. She suggested that the way for improving deinkability is to understand the differences between these grades, enabling manipulation of the parameters of deinking effectiveness.

There is a great concern in the recycled paper industry that it is impossible to economically produce high-quality, moderate- to high-brightness pulp from mixed paper waste without using chlorine-containing compounds. Thomas Kulikowski of Air Products and Chemicals demonstrated how oxidative technology eliminates chlorine from the bleaching sequence. This processing of deinked pulps of varied compositions resulted in an 80–95% decrease in contaminants, an 80–100% detackification, and marked improvements of screen yields on post-consumer wastes and wet-strength, resin-coated wastepaper.

Secondary fiber supply and quality

As part of a roundtable on the supply and quality aspects of secondary fiber, chaired by John C. Philips of the Harris Group, panel members discussed how their companies were involved in the problems of waste paper supply and quality. Two of the panelists were directly

involved with the collection and redistribution of waste paper, and one was a consumer of waste paper at a mill.

R.M. Getter, with All Waste Paper Recycling Inc., discussed the evolution of his company's operation as a waste paper broker for the mills in his area. They produce 4000 tons/month of high-quality recycled paper specifically packaged for the mills in their area. They have evolved from a general broker of waste paper stock, to a proactive seeker of very specific grades and qualities of waste paper. Over 60% of their baled waste is consumed by mills located within 200 miles of their plant, and over 90% within 400 miles. Shipping costs are the limiting factor.

The other supplier of waste paper for mills was Eric Johnston of Weyerhaeuser's new waste paper processing facility in Portland, OR. This facility was developed to work with waste paper collectors and recyclers to improve the quality of the collection process and also the quality of the waste paper going to the mills.

They receive newsprint in a variety of forms, mostly in bales or loose in recycling bins from local recyclers, which is sorted and cleaned in the Portland facility. The goal is to produce waste bales that are less than 0.25% contaminants. Waste coming into the facility averages more than 1% contaminants. At the facility, each load coming in is sampled and a report is made, which is faxed that day back to the supplier that delivered the load. The object is to get the suppliers to improve their own segregation techniques and improve the quality at the source.

The ultimate goal is to get the collectors of waste paper to produce waste that is clean enough to be sent directly to the mills by the original collector and not go through the sorting facility. The facility currently produces 300,000 tons/year of waste news.

The mill perspective

Robert L. Miller gave the mill experience in recycling. His

mill, the former Publishers Paper mill at Oregon City, OR, uses 40% recycled newsprint in its production. Because it has no warehousing space (it is built into a cliff along the Willamette River), the mill cannot sort or store waste paper and is dependent on the supplier to provide clean waste news.

The problems associated with these physical limitations led the mill to establish some strict standards for incoming waste paper. These are:

1. No plastic.
2. No kraft liners or poly liners.
3. The driver of the truck is responsible for the load. If it is rejected, the driver must correct the problem or return it.

The most significant problems with the waste news are inconsistent bale size, widely variable compression within the bale, and moisture content and the associated mold and mildew.

The mill gets waste paper from as far south as San Diego, CA, and as far east as Denver, CO. Waste paper comes in by truck and railcar. In general, baled news is more compact, easier to store, and, easier/cheaper to ship. However, baling wire and straps are a problem. Loose news has fewer contaminants but is less homogenous than baled news. The age of the news is a factor in recycling. News older than 6 months (by date on issue) is considered a contaminant and will cause a load to be rejected.

From the mill perspective, consistency of product is the single most important quality of the product delivered. If the waste news quality is consistent, the mill can adjust its process to work with it. Waste paper brokers and suppliers and collectors should strive for this.

Nonwood fibers—kenaf

John T. McCloskey of PEADCO moderated a roundtable that focused especially on the role and usefulness of kenaf. The panelists presented their insights and positions on the use of kenaf as a suitable fiber for industrial-scale development and then opened the floor to questions.

Rosely M.V. Assumpcao, from the United Nations Industrial Development Organization, has noted two barriers to implementation based on her experience with developing a large-scale paper production facility using nonwood fibers. One is a technical barrier in recovering the spent pulping liquor. This can be a formidable barrier in many parts of the world because of supplemental fuel costs and environmental problems. The second barrier is financial. The costs of producing paper from nonwood pulps can be as high, or higher, than for wood-fiber-based papers (even imported paper), requiring subsidies or import restrictions, both of which limit the amount of outside financial support available.

Andrew F. Kaldor of Ankal Pty. Ltd. noted that kenaf, among all fibers grown primarily for paper production, is well placed for long-term growth because its price will decrease as more is planted in larger plantations and

more efficient planting, cultivating, and harvesting procedures are developed. Wood fiber, on the other hand, will increase in cost over time from restrictions on harvesting techniques and as pressures on land use cut available supplies.

D.E. Kugler, U.S. Department of Agriculture, talked about how the USDA tries to bring researchers together with private sector producers to design, develop, and bring new products to the market. From this effort, a small newsprint mill was built in south Texas to produce newsprint from 100% mechanically pulped kenaf. The planting cycle for kenaf in this region is from January to June and harvest cycle is from July to December, minimizing the storage problems associated with kenaf.

Joseph Kurdin, a consultant in the nonwood fibers area, focused his presentation on the economics of wood fiber use vs. kenaf in North America. While kenaf can produce good paper, it requires too much new investment in handling and processing facilities at mills to displace wood use. The best chance for its widespread use will be with mills that find traditional wood sources gone and are in a position to recapitalize their fiber acquisition, storage, and processing facilities.

Alfred Wong of Arbokem, long known for his work in sulfite pulping, presented his views on kenaf and other agricultural fibers. His contention is that farmers will not grow kenaf because their profit is much lower than on other crops. He is working on a project using flax, in which the farmer makes his money off selling the flax seed for oil and the flax straw is pulped for paper. The largest opportunity in North America would be for developing wheat straw pulping. Wheat straw is the largest single volume of agricultural by-product generated in North America, and research has shown that wheat straw pulp produces good newsprint.

Kenaf's suitability discussed

Questions from the audience centered on the limitations of kenaf in developing countries. The panelists were forthright in noting that kenaf is a "displacement" crop, one that consumes land and water for a final product that is an industrial feedstock only. Developing countries with limited food production will not find it acceptable. Kenaf's greatest potential is in countries that can produce a food surplus, but are fiber limited and want to use arable land to support an industry.

In developed countries, interest in kenaf comes from environmental pressures on existing wood supplies, or political pressure to be independent in paper production. In the United States, concern over the long-term availability of wood from national and state forests in the West has driven what little interest there has been in commercial kenaf production.

One person asked why the obsession with newsprint, why not chemically pulp kenaf and produce higher-value products such as tissue or printing and writing grades? The response was that newsprint could be made from

mechanically pulped kenaf that used the entire plant, which in turn eliminates a waste stream and the corresponding environmental concerns. Newsprint is also a readily marketable commodity throughout the United States, making it a desirable test bed for development.

The second nonwood fibers session addressed the problem of bagasse storage and deterioration, the yield components of kenaf, and an analysis of rice straw based mechano-chemical pulp for processing. As long-term storage of bagasse, usually in excess of 3 months, is required for almost all bagasse pulp mills, it is essential for every mill to select a storage and handling system based on the specific conditions of that particular mill. In this way, the mill can minimize the deterioration of the bagasse and avoid the subsequent loss of pulp quality and brightness.

Satellite vs. mill-site chipping

The main concern in debating the advantages of satellite chip plants over mill-site chippers is quality control. Louis N. Flanders moderated a rousing discussion of the advantages and disadvantages of both locations. Panelist Willard H. Huggins, Federal Paperboard, noted that a mill yard chipper gives the mill only one freight charge, the ability to store enough chips for the mill to run for several weeks in case of emergencies, and a fixed cost.

A mill can benefit from using a satellite chip plant, however, by saving money on freight in other ways, extending their procurement territory, hedging against shortages, preserving capital, and lowering labor costs, according to panelist William F. Watson of Mississippi State University. The mill will, however, lose a certain amount of control.

The definition of a satellite chip plant is also a big question, as there seems to be a "magical distance" between the mill and the satellite, says Watson. Huggins repeated that "each system is unique." Everyone agreed that the decision is not just economic, each decision should be sight specific, and that the definition of quality is still vague.

Mechanical pulping

Mixing white birch with aspen chip in chemithermomechanical pulping results in a reduction of specific refining energy requirements and improves optical and mechanical characteristics of the resulting pulps. Jacques L. Valade, University of Quebec, experimented with partial substitutions of birch in aspen and discussed results in wood properties, pulp properties, and mechanical properties during the second mechanical pulping session.

This session also featured papers on the effects of electron beam treatment on wood components and the effects of electron beam pretreatment of wood chips on energy consumption.

Bleach plant control

Control equipment, techniques, and results are ever more critical as people call upon bleaching to do the near-

impossible. A couple of points that emerged from sessions on bleach plant control were these:

- Robert Powell (ABB Automation): Dozens of OPTI-Kappa units are now in routine use, not just for before/after measurements to control oxygen delignification, but also as feedback sensors for digester control and to determine washing efficiency and front-end bleach plant control via dissolved lignin measurements.
- Jeffrey A. Baker (Kajaani): Increasingly, pulp brightness and chemical residual sensor pairs are being installed at end-of-tower locations to fine-tune the control of bleach chemical additions and usage.

Keynote address

Carl A. Hammerschlag, a Yale-trained psychiatrist who spent almost 20 years working as a physician with American Indians of the Southwest, was keynote speaker.

People are often trapped by their own preconceptions, Hammerschlag said. That, in turn, may limit their happiness or their accomplishments. The trick is to look beyond those preconceptions. He used examples of several people who through disease or accident had become physically impaired. Instead of lamenting their fate, they had dealt with it and accomplished more as a result. Problems and change are part of life. You will be trapped by your fears unless you face them and confront them, he said. Like the turtle, in order to move, you have to stick out your neck.

As closing comments, Hammerschlag urged attendees to think of the Earth as being on loan from their children and urged a detente with environmentalists. He also suggested they make more effort to advertize the progress made in the industry and to learn to deal with the press.

Awards

The Sulfite and Semichemical Pulping Committee of TAPPI's Pulp Manufacture Division dedicated a panel it donated to the TAPPI mural during the conference. The panel measures 3 1/2 ft. by 2 ft. and commemorates the invention of sulfite pulping, which led to the use of sulfurous acid to separate wood fibers. The sulfite process has been refined and is still used today. The mural honors all professionals who have contributed to the growth and sustainability of the sulfite pulping industry during the past century. When completed, it will consist of 10 laser-engraved walnut panels, with each panel representing a milestone in the history of the paper and related industries. The panels will cover a total area of some 16 ft. long and 8 ft. high on the wall of the atrium lobby of the TAPPI headquarters building in Norcross, GA.

Walter J. Bublitz, retired professor of pulp and paper technology at Oregon State University, received the 1991 TAPPI Pulp Manufacture Division Award and Johan C.F.C. Richter Prize, with an honorarium of US\$ 1000.

Wayne F. Carr, president of Wayne F. Carr Associates and vice president/general manager of EcoFibre, Inc., was presented with the 1991 TAPPI Pulp Manufacture Division Leadership and Service Award and the Joseph

NLK-Celpap U.S. sponsors Third Annual 5 Kilometer run

The unusually frigid weather was the main topic of conversation as runners huddled together before the 3rd annual Pulping Conference Walk & Run. Despite the gray predawn skies and chilly breeze, 46 runners turned out for the race, helping to raise US\$ 945 for pulp and paper scholarships.

Whether it was months of training and the spirit of competition, or the thought of a cup of hot coffee waiting inside the hotel, these runners made good time around the 5K course. Norbert Nimmerfron placed first with a time 19:39. He was followed by Johan Nylander at 20:11 and Bill Miller at 20:24. Ann Schoen was the first womena across the line with a time of 24:19.

NLK-Celpap added a one mile walk/jog course this year for the less serious competitors. In the men's division, Brian Heimbigner come in first, John Bryce placed second, and Jim Coster third. In the women's division, Barbara van Lierop placed first, Theresa Choh-Lee second, and Karen Chistopherson third.

Money raised at this race is being used to help fund scholarships at the University of Wahsington, The Institute of Paper Science and Technology, the University of Maine, and the University of Miami.

— D. Elizabeth Swann

1991 NLK-Celpap Walk & Run participants

Robert Miller, Richard Bender, Bill Austin, Jim Coster, Mark Gilkey, Ann Schoen, Matthew Coleman, Brian Heimbigner, Bill Maisel, Azim Shariff, Bernie Yemc, John Howard, Wayne Bowling, Clayton Williams, Bill Miller, Hans Suess, Mr. and Mrs. John McClendon, Mark Nichols, Mr. Lachenal, Douglas Thornton, Rolf Ryham, Bob Pederson, Art Jepsen, Trish Mitchell, Fay Jepsen, Mr. and Mrs. James Wood, Karen Christopherson, Mike Haas, Jack Luxardo, Mrs. Harry Rice, Greg Landry, Johan Nylander, Ted Poulin, Philip Williams, Barbara Van Lierop, Steve Stratton, John Bryce, Warren Johnson, Steve Dunn, Mark Kirby, Bengt Nilsson, Theresa Choh-Lee, Thomas Werkema, Robert Quedes III, and Norbert Nimmerfron

K. Perkins Scholarship Prize, with a US\$ 1000 honorarium.

Certificates of Appreciation were presented to Division Chairman William S. Fuller and Committee Chairmen Hector J. Audette, John Badiuk, Daniel S. Blevins, Stan W. Brewer, R. Terry Campbell, Peter F. Fredericks, Tom G. Garbutt, Paul G. Linsen, and J. Brian Wofford.

The 1990 Pulp Manufacture Division Best High Impact Paper Scholarship Award was presented to C.

Bertil Stromberg. The paper, "Washing for low bleach chemical consumption," was published in the October 1991 *Tappi Journal*.

Special recognition was given by Jean-Claude Corbi of the contribution of Raymond C. LaChapelle, co-chairman of the pulp bleaching division, who died 6 weeks before the conference. We were honored to have Mrs. LaChapelle at the conference to share in this remembrance. □