

PROJECT REFERENCE LIST

TECHNOLOGY TRANSFER & ADVISORY SERVICES



Wheat Straw Market Pulp Mill

Provided expert opinion on a new process for producing wheat straw market pulp.

Client: Confidential
Location: USA
Materials: Wheat straw
Products: Market pulp

Nonwood Fiber Market Pulp Mill

Provided expert advise and design services for a nonwood fiber market pulp mill.

Client: Confidential
Location: US
Materials: Confidential
Products: Market pulp

Specialty Paper Mill

Provided expert advise and financial analysis for order-of-magnitude study for a new specialty paper mill.

Client: Danforth Group LLC
Location: US
Materials: Purchased pulps
Products: Confidential

Bamboo Substitutes

Evaluation of bamboo species that could be used as substitutes for softwood based on fiber characteristics, biomass production per hectare per year and growing conditions based on an extensive literature review.

Client: Confidential
Location: Brazil

Biomass Preparation Trials for Biofuel Production

Provided expert advise on the preparation of biomass for biofuel production using special commercially available equipment. Observed pilot plant trials and provided advise on the commercial facility design.

Client: Confidential
Location: Confidential
Materials: Confidential
Products: Liquid biofuels

Digester Capacity Increase

Provided expert advice on how to increase the capacity of a horizontal tube digester by 15%, cost estimating and identified potential risks to other areas of the bleached bagasse pulp mill.

Client: Carvajal Pulpa y Papel
Location: Cali, Colombia
Materials: Sugarcane bagasse
Products: Printing/writing paper

New Technology Evaluation

Reviewed new technology for semi-chemical wheat straw pulp production developed in the United Kingdom, provided risk assessment for potential investor.

Client: Siata DS, Inc., USA
Materials: Wheat straw
Products: Market pulp

Bagasse for Cellulosic Biofuels

Provided expert advise on preparing sugarcane bagasse for cellulosic biofuel production.

Client: Iogen Energy Corporation, Canada
Materials: Sugarcane bagasse
Products: Cellulosic biofuels

Alternative Nonwood Fiber Raw Material

Provided expert advice on mill modifications required to prepare, clean and process a new nonwood fiber raw material to replace sugarcane bagasse.

Client: Grupo Papelero Scribe SA de CV
Location: Orizaba, Mexico
Materials: *Pennisetum purpurem* (Elephant grass, napier grass)
Products: Printing/writing paper

Nonwoods for Dissolving Pulp Production

Provided expert advice on various nonwood fiber raw materials and their suitability for dissolving pulp production.

Client: Confidential
Location: USA
Materials: Various nonwood fibers
Products: Dissolving pulp

Carpet Recycling

Provided expert advice on the use of pulp & paper equipment for processing and recycling old wall-to-wall carpeting to reclaim the nylon, polypropylene and carpet sand.

Client: Modular Carpet Recycling
Location: USA
Materials: Waste wall-to-wall carpet
Products: Separated nylon, polypropylene, carpet sand

Bagasse for Use in Cellulosic Biofuels

Provided expert advice on the use of sugarcane bagasse for pulp & paper production and for cellulosic biofuel production. Advised on CAPEX requirements and scalability of major equipment.

Client: Confidential
Location: USA
Materials: Sugarcane bagasse
Products: Cellulosic biofuels



Pulp Mill Conversion

Visited an abaca market pulp mill to determine if it could be converted to produce bleached bagasse market pulp. Prepared report covering technical issues relating to the conversion and solutions to allow bagasse pulp production.

Client: Confidential
Location: Philippines
Materials: Abaca, sugarcane bagasse
Products: Bleached market pulp

Production Audit/Rationalization

Visited ABC Paper, recommended solutions to several problems in the pulp mill, advised client on grade lines to be produced on 3 smaller paper machines, provided advice on operating problems on 4th large paper machine, advised client regarding new market opportunities in the "green" market in North America, advised client on "green" certification requirements.

Client: ABC Paper Limited
Location: Saila Khurd, India
Materials: Wheat straw, local grasses, hardwood, purchased woodpulp
Products: Uncoated printing/writing papers

Recyclability of Tree Free Paper

Provided expert opinion on the recyclability of TreeFrog 100% tree-free multi-purpose copy paper produced from 25% bleached bamboo chemical pulp and 75% bleached sugarcane bagasse chemical pulp. Arranged laboratory testing that confirmed recyclability of the paper within USA wastepaper mix.

Client: TreeZero, LLC
Location: Norcross, GA, USA
Materials: Bamboo, bagasse
Products: Multi-purpose copy paper

Wheat Straw for Molded Products

Provided overview of producing high yield semichemical pulp from wheat straw for use in molded products. Identified most promising processes and equipment based on cost effectiveness and product quality.

Client: Confidential
Location: USA & International Operations
Materials: Wheat straw
Products: Tableware, clamshell packaging

Production Program Audit/Rationalization

Visited PROPAL 1, recommended solutions to several problems in the pulp mill, advised client on the grades of paper best suited to high bagasse content, reviewed production program, advised regarding "green" market opportunities in North America, advised regarding "green" market requirements and green certification.

Client: Productora de Papeles S. A. (PROPAL)
Location: Cali, Colombia
Materials: Sugarcane bagasse, purchased softwood pulp

Products: Uncoated and coated printing/writing papers

Pilot-Scale Pulping System

Developed specifications for a horizontal tube digester system with feed system and blow tank, issued specifications to preselected vendors, analysed proposals and reported to client.

Client: Confidential
Location: Canada
Materials: Agricultural crops & residues
Products: Confidential

Fiber Preparation System Audit - Cellulosic Biofuel Demo Plant

Inspected existing fiber preparation system for nonwood fiber raw materials that was experiencing problems with excessive stones, sand and dirt and recommended system additions to provide well cleaned fiber to the digester.

Client: Confidential
Location: USA
Materials: Confidential
Products: Cellulosic ethanol

Alternative Nonwood Fiber Mill-Scale Trial

Provided expert advice during a mill-scale trial of an alternative nonwood fiber raw material to replace sugarcane bagasse.

Client: Grupo Papelero Scribe SA de CV
Location: Orizaba, Mexico
Materials: Pennisetum purpurem (Elephant grass, napier grass)
Products: Wet lap pulp, printing/writing papers

Nonwoods for Tissue & Personal Hygiene Products

Provided overview of various nonwood fibers that can be used in tissue and personal hygiene products. Identified most promising nonwood fibers based on cost effectiveness and product quality.

Client: Confidential
Location: USA & International Operations
Materials: Sugarcane bagasse, cereal straws, bamboo, reeds, grasses, etc.
Products: Tissue, personal hygiene products

Nonwoods for Molded Products

Provided overview of various nonwood fibers that can be used in molded products. Identified most promising nonwood fibers based on cost effectiveness and product quality.

Client: Confidential
Location: USA & International Operations
Materials: Sugarcane bagasse, cereal straws, bamboo, reeds, grasses, etc.
Products: Tableware, clamshell packaging



Bagasse Molded Products & Copy Paper

Provided expert advice on bagasse products and revised client web site for technical aspects.

Client: The Sugar Cane Paper Company
Location: USA
Materials: Sugarcane bagasse
Products: Tableware, clamshell packaging, copy paper

Bagasse Pulp Mill Audit

Provided solutions for operating problems and high bagasse costs at an existing bagasse pulp mill including identification of an alternative fiber raw material for the mill.

Client: Grupo Papelero Scribe SA de CV
Location: Orizaba, Mexico
Materials: Sugarcane bagasse
Products: Wet lap pulp, printing/writing papers

Bagasse Recycled Fiber

Provided justification that sugarcane bagasse could be considered as a recycled fiber raw material based on FSC definitions of recycled raw materials. Government of Mexico has since granted bagasse a "recycled fiber" designation.

Client: Grupo Papelero Scribe SA de CV
Location: Orizaba, Mexico
Materials: Sugarcane bagasse
Products: Wet lap pulp, printing/writing papers

Nonwood Fiber Dissolving Pulp

Provided expert advice regarding the use of nonwood fiber raw materials for the production of dissolving pulp for use in specialty chemicals.

Client: Confidential
Location: USA
Materials: Sugarcane bagasse, bamboo, giant reeds, industrial hemp, flax, cotton linters

BCTMP Whole Stalk Kenaf Pulp Mill - Part 3

Inspection of equipment to be used for preprocessing the kenaf prior to mechanical pulping.

Client: Andritz Inc., Vienna, Austria
Project: 100,000 mt/year BCTMP pulp mill
Location: Vietnam
Materials: Kenaf
Products: BCTMP market pulp

Patent Application Review

Reviewed a patent application and examiner's responses with respect to providing responses for the client to the patent office.

Client: Alberta Research Council
Project: Details confidential

Nonwood Fiber Pulp & Paper Mill Chemical Recovery

Provided options for nonwood fiber preparation systems, desilication systems and black liquor chemical recovery systems.

Client: Prairie Pulp & Paper Inc.
Project: 200,000 mt/year fine paper mill
Location: Manitoba, Canada
Materials: Wheat straw, oilseed flax straw
Products: Printing & writing paper

Nonwood Fiber Biofuels Seminar

Presented a seminar on nonwood fiber raw material harvesting, storage and preprocessing for hydrolysis/fermentation and gasification applications for biofuel production.

Client: Andritz Ltd.
Location: Quebec, Canada
Materials: Cereal straws, prairie grasses, sugarcane bagasse, flax, hemp, jute, bamboo, giant reeds

Renewal of Closed Greenwood Market Pulp Mill

Provided expert advice regarding alternative possible projects for the renewal of a closed groundwood market pulp mill including molded products and biomass to energy generation.

Client: Confidential
Location: Quebec, Canada
Materials: Nonwood fibre raw materials, waste wood, peat

BCTMP Whole Stalk Kenaf Pulp Mill - Part 2

Provided expert advice regarding a novel approach towards preparing and cleaning whole stalk kenaf raw material for delivery to the refiners as well as establishing the basis for process guarantees.

Client: Andritz Inc., Vienna, Austria
Project: 100,000 mt/year BCTMP pulp mill
Location: Vietnam
Materials: Kenaf
Products: BCTMP market pulp

Grant Funding Application Review (2006)

Reviewed 39 applications for grant funding in the agricultural sector.

Client: Alberta Agricultural Research Institute, Edmonton, Alberta, Canada

Urban Forest Recyclers Inc., Swift Current, SK, Canada

Prepared specifications and tender documents and solicited bids for a 100 ton per day wastepaper recycling for two new mills.

Location: Swift Current, SK, Canada
Materials: Wastepaper
Products: Molded trays



Research & Development Work on Straw Mulch

Project manager for research and development work to soften straw mulch to increase pumpability. Developed RFP for work to be carried out in labs, set test conditions, monitored lab work.

Client: Confidential
Location: North America
Materials: Straw
Products: Mulch

Grant Funding Application Review (2005)

Reviewed 47 applications for grant funding in the agricultural sector.

Client: Alberta Agricultural Research Institute, Edmonton, Alberta, Canada

Industrial Hemp Pulp Mini-Mill Review & Commentary

Reviewed and commented on concept for a mini-mill based on industrial hemp. Developed alternative concepts including recommendations for process selections to minimize environmental discharges.

Client: ITRAB, Linköping, Sweden
Project: Mini-pulp mill
Location: Sweden
Materials: Industrial hemp
Products: Market pulp

Used Kraft Pulp Mill Inspection

Visual inspection and assessment of a 400 t/d bleached hardwood kraft pulp mill and report on its condition and suitability for relocation. Assessment covered cooking, brown stock washing, screening & cleaning, bleach plant, evaporators, recovery boiler and recausticizing system.

Client: Industrial Exchange Corporation, Richmond, VA, USA
Location: Maine, USA

BCTMP Whole Stalk Kenaf Pulp Mill - Part 1

Provided expert advice regarding various methods for preparing and cleaning whole stalk kenaf raw material for delivery to the refiners.

Client: Andritz Inc., Vienna, Austria
Project: 100,000 mt/year BCTMP pulp mill
Location: Vietnam
Materials: Kenaf
Products: BCTMP market pulp

Research & Development Work on Oil Palm Empty Fruit Bunches (EFB)

Project manager for developing appropriate cooking and bleaching conditions for EFB raw material and production of pilot scale unbleached and bleached papers using the EFB pulp. Established test conditions and directed test work carried out at a USA-based laboratory/pilot plant.

Client: Eko Pulp & Paper Sdn. Bhd., Malaysia
Project: 100,000 mt/year BCTMP pulp mill
Location: Malaysia
Materials: Oil palm empty fruit bunch

Investigation of Alternative Cellulose for Termite Bait

Technical assistance/investigation of alternative lower cost cellulose sources and grinding/milling systems.

Client: ENSYSTEX, North Carolina, USA

EPYTEK S.L., San Sebastian, Spain

Technical assessment and review of a black liquor chemical recovery system developed in Spain for small to medium scale wood and nonwood pulp mills.

Changing World Technologies, West Hempstead, NY, USA

Technical assessment of patented thermo-depolymerization (TDP) process for use in the pulp and paper industry including chemical recovery and organic waste treatment, and assistance in market development.

Spixel Inc., Beauharnois, Quebec, Canada

Expert advice on expansion of pulp mill capacity and capabilities.

Project: Pulp mill expansion
Location: Beauharnois, Quebec
Materials: Cotton rag
Products: Currency, high quality writing paper

Consoli Consulting Company, Media, PA, USA

Member of Peer Review Panel for life cycle analysis (LCA) on the use of cereal straw in directory grade papers.

Project: LCA Peer Review Panel
Location: North America
Materials: Wheat straw
Products: Directory paper for telephone directories

INNOTECH, Newtown, CT, USA

Innovation/brainstorming expert session on the use of a new biodegradable polymer in the pulp and paper industry.

Project: Expert Session
Location: North America
Materials: New polymer

Urban Forest Recyclers Inc., Swift Current, SK, Canada

Technical report on the use of agricultural residues in molded egg trays.

Location: Swift Current, SK, Canada
Materials: Wheat straw, flax straw, wastepaper
Products: Molded trays



New Fibre Crop, North America

Review and analysis of costs for producing and processing new crop fiber into pulp for high groundwood content papers.

Client: Confidential
Location: North America
Materials: Confidential
Products: Newsprint, high groundwood content papers

Pulp and Paper Research Institute of Canada

Vancouver Laboratory, Vancouver, BC, Canada

Technical review of PAPRICAN's report on Nonwood Pulping Technologies to identify opportunities for producing pulp from agricultural residues in Alberta, Canada

Project: Review of Nonwood Pulping Technologies
Location: Alberta, Canada
Materials: Wheat straw
Products: Pulp

Phillips Fox, Perth, WA, Australia

Expert witness report concerning a failed bagasse market pulp mill project.

Location: Australia
Materials: Sugarcane bagasse
Products: Market pulp

U.S. Department of Agriculture, Washington, D.C., U.S.A

Technical and commercial review of several applications for financial support for research and development of new technologies which would lead to commercial use of domestic nonwood fibers by the U.S. pulp and paper industry.

U.S. Department of Energy, Golden, Colorado, USA

Technical and commercial review of applications for financial support for research and development of new technologies which would lead to commercial use of domestic nonwood fibers by the U.S. pulp and paper industry.

Asian Development Bank, Manila, Philippines

Technical seminars sponsored by the Asian Development Bank to strengthen the People's Republic of China government implementation capacity in the pulp and paper sector. Over a period of three (3) months, the seminars covered feasibility study and tender document preparation, the latest trends and technology in kraft pulping and short sequence bleaching, effluent treatment and environmental impact, bagasse newsprint production and nonwood fiber pulp and paper production. Technical analysis of seven operating pulp and paper mills also was carried out including recommendations for improving mill operations.

Client: Guangxi Bureau of Light Industry Project
Location: Nanning, P.R. of China
Materials: Sugarcane bagasse, cereal straws, bamboo, softwood, hardwood

Products: Printing & writing paper, kraft papers, newsprint, linerboard

Canadian Investor Group

Assessment of the value of 350 mt/day bleached softwood market mill assets and financial projections concerning the long-term viability of the mill (for potential purchaser).

Mill: Celulosa de Guatemala, S.A.
Location: El Rancho, Guatemala
Materials: Softwood
Products: Bleached market pulp

Canadian International Development Agency (CIDA)

Hull, Quebec, Canada

Procurement advisory services, specifications, bid analysis, monitoring and transportation services for \$2,800,000 line of credit from CIDA to the Khulna Newsprint Mills.

Project: Khulna Newsprint Mills Balancing, Modernization, Rehabilitation & Expansion Program
Location: Khulna, Bangladesh
Materials: Tropical hardwoods
Products: Newsprint

Simons Eastern, Atlanta, Georgia, USA

Assistance in developing package bidding documents.

Project: Panafrican Paper Mills (E.A.) Ltd.
Location: Webuye, Kenya
Materials: Softwood
Products: Newsprint, printing & writing paper, sack kraft, linerboard

Zenith Paper Company, Banah, Punjab, India

As Zenith's Technical Consultant for a five year term, assisted management of existing 30 mt/day writing and printing pulp and paper mill including improvements to existing operations and reduced costs, replaced imported long fiber wood pulp with in-house cotton liners pulping, increased production to 50 mt/day, and provided training for technical personnel.

Location: Banah, Punjab, India
Materials: Cotton linters, wheat straw, rice straw, hessian (jute bags), wastepaper
Products: Printing & writing paper