

The last two decades have seen considerable improvement in the environmental performance of pulp and paper mills. Spurred on by local environmental requirements and by global market pressures, each new generation of mill technology has achieved lower discharge of water and pollutants and less waste of energy, chemicals and fibre.

The NORAM Approach:

- *Tailored to individual mills*
- *Minimal equipment requirements*
- *Based on mill experience and the latest R & D findings*
- *Combines effluent reduction with process savings*

POLLUTION PREVENTION

NORAM Engineering and Constructors is assisting mills to adopt these new approaches to pollution prevention through its services in Effluent System Closure. Drawing on 25 years experience in system closure in the Canadian industry, NORAM provides a tailored approach that opens the possibilities of reduced discharges for older mills and production expansions.



ELIMINATION OF BLEACH EFFLUENTS

NORAM can provide chemical pulp mills with engineering support and technology for recovery and elimination of bleach effluents involving only modest equipment requirements.

SAVINGS OF WATER AND ENERGY

NORAM is assisting newsprint operations achieve simultaneous savings of water and energy through the application of the principles of system closure.

NORAM Products and Services for the Pulp and Paper Industry:

CHEMICAL PRODUCTION:

- GAP Plus™ ClO₂ waste acid recovery
- ClO₂ plant optimization
- Papricycle® for bleach caustic savings
- Paprilox® for increasing Kraft pulp yield (In N.A.)

ENVIRONMENTAL:

- Effluent system closure technology
- Kraft mill odour-control systems (HVLC and LVHC)
- Skewed Gas technology for electrostatic precipitator enhancement
- Vertreat™ Activated Sludge Process

ENERGY:

- Energy optimization studies
- Heat exchanger networks
- Power and Co-generation engineering



NORAM Engineering and Constructors Ltd.



COMPANY PROFILE

NORAM is an engineering and technology development firm based in Vancouver, Canada. Founded in 1988, NORAM employs a highly qualified technical staff of approximately one hundred. NORAM has a global client base and has successfully completed projects on five continents.

Today NORAM is the world's leading supplier of mononitrobenzene (MNB) plants, a key intermediate in the production of polyurethane. In addition, NORAM offers sulfuric acid equipment, biological treatment facilities, energy systems, and technologies for the chemical, minerals processing, environmental, and pulp & paper industries.

NORAM offers proprietary technology to customers through engineered equipment and complete chemical plants. NORAM's core competencies include:

- Biological Treatment Technologies
- Electrochemical Systems
- Energy Systems
- Environmental Technologies
- Feasibility Studies
- Fluid Dynamics & Finite Element Analysis
- Heat Transfer Systems Design
- Nitration Technology
- Project Management
- Pulp & Paper Technologies
- Sulfuric Acid Manufacture

PARTNERING WITH INNOVATION AND EXPERIENCE

NORAM is focused on the development, commercialization and supply of established and novel processes. With its entrepreneurial culture, NORAM has a demonstrated track record of thinking outside the box to provide innovative solutions. Technologies can be evaluated and integrated into an advanced engineering solution based on first principles.

NORAM has made its mark internationally by supplying proprietary systems to various industries world-wide. NORAM can bring this expertise and innovative ideas to your projects.

NORAM has established strategic relationships with the following organizations:

- ◆ Bateman Engineering BV
- ◆ Canadian Hydrogen and Fuel Cell Association
- ◆ Eco-Tec
- ◆ First Chemical Corporation (A DuPont Company)
- ◆ FP Innovations
- ◆ Kemetco Research Inc.
- ◆ Membrane Reactor Technologies
- ◆ Ostara Nutrient Recovery Technologies Inc.
- ◆ Radient Technologies
- ◆ Siloxy Limited
- ◆ Simon Carves Limited (Punj Lloyd Group)
- ◆ The Electrosynthesis Company

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