

Effluent Systems Closure

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

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

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.

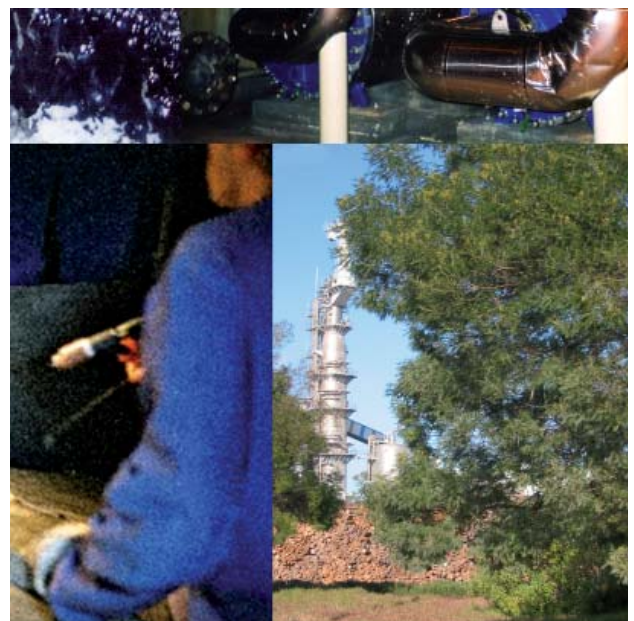


Elimination of bleach effluents

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.



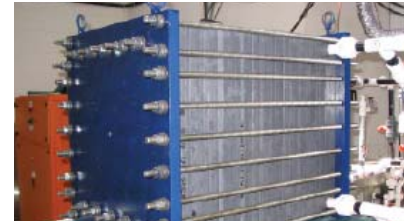
technology and engineering solutions for the process and resource industries



Nitration



Sulfuric Acid



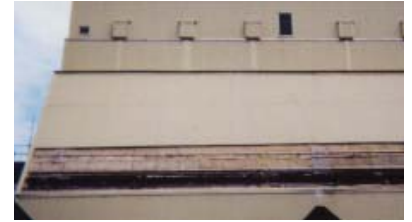
Electrochemical



Biosystems



Pulp&Paper



Environmental

Company Profile

NORAM is a private engineering and technology firm based in Vancouver BC, Canada. We specialize in the development, engineering and commercialization of new chemical processes, and in the improvement and optimization of existing technologies. Since 1988 NORAM has provided leading-edge technologies to the chemical, pulp and paper, minerals processing, wastewater and electrochemical industries.

Today NORAM is the world's leading supplier of nitration technology. In addition, we offer sulfuric acid plants, biological treatment facilities, energy systems, and technologies for the clean-tech sectors.

Our business has developed around the supply of proprietary engineering and equipment packages to our clients.

Core competencies include:

- Nitration and NO_x Technology
- Electrochemical Systems
- Sulfuric Acid Manufacture
- Biological Wastewater Treatment
- Computational Fluid Dynamics & Finite Element Analysis
- Heat Transfer & Heat Exchangers
- Hydrogen, Sulfur and Chlorine Chemistry
- Fluidised Bed Systems
- Energy Storage
- System Closure

Partnering with Innovation and Experience

NORAM works extensively with early-stage technology companies. We draw on established competencies in process design and engineering, provide custom in-house fabrication capabilities, and offer pilot plant and contract research facilities to support the commercialization process.

We've teamed up with organizations around the globe to allow project execution on 5 continents. Our strategic relationships include:

- Bateman Engineering BV
- Canadian Hydrogen and Fuel Cell Association
- ECO-TEC Inc.
- First Chemical Corporation (a DuPont Company)
- FP Innovations
- Kemetco Research Inc.
- Membrane Reactor Technologies
- Ostara Nutrient Recovery Technologies Inc.
- Radiant Technologies Inc.
- Siloxy Limited
- Simon Carves Ltd (Punj Lloyd Group)
- Electrosynthesis Company Inc.

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