

## RAILWAY ENGINEERING AND TECHNICAL SERVICES FOR THE MINING INDUSTRY



We offer a comprehensive range of services in the planning, engineering, implementation and operation of mining railways, to ensure that they provide reliable and efficient transportation to support their associated mining property.

Our expertise in railway engineering and technical services for the mining industry originates from experience acquired with Canada's major railways and has been further developed through work performed for mining companies worldwide. We provide reliable and cost-effective solutions during every stage of a project cycle – from preliminary planning to on-going operations. CANARAIL assists mining companies from the early stages of transport development, through engineering design, maintenance and operations planning, and/or the provision of technical assistance in all railway-related disciplines.

An audit of the current operations by CANARAIL can determine the potential for capacity increases, operational improvements and cost reductions to assure that the mining railway can produce reliable transport at the lowest possible cost per tonne. Other areas of expertise include the analysis of maintenance practices for rolling stock, and/or technical support to identify the most efficient ways of optimizing equipment reliability.

CANARAIL Consultants Inc. offers an extensive range of services in railway transportation. These services include specialized expertise in civil and mechanical engineering, railway operations, signalling and telecommunications, finance, economics, marketing and training, as well as institutional and environmental disciplines.

# SCOPING – PRE-FEASIBILITY – FEASIBILITY STUDIES

- **High-level scoping studies**
- **Detailed bankable studies**
- **Long-term investment optimization (capital costs versus long-term operating costs)**
- **Investment evaluation and assessment**

## PROJECTS

- > Feasibility study for the construction and operation of a rail line between a new mine and proposed port sites on Baffin Island, Canada, for **Baffinland Iron Mines Corporation**.
- > Review and optimization of proposed 50-km alignment between Juruti Port on the Amazon and a potential **Alcoa** bauxite mine in Brazil.
- > Preliminary scoping study for **Bumigeme Inc.** to evaluate the railway requirements for serving a potential iron ore mine at Peppler Lake, north of the St. Lawrence River in Canada.
- > Estimation of railway costs related to the development of an integrated alumina complex for **Alcoa**.
- > Railway operations study for **Aluminpro Inc.** to assess the capital and operating costs associated with the transport of 2.8 mtpy of bauxite over 650 km of existing line and 115 km of new railway in Cameroon.
- > Rail transportation feasibility study for **Asia Energy Corporation** regarding transportation of coal from the Phulbari Mine to Khulna in Bangladesh.
- > Technical, economic and financial feasibility study of a new railway line and port installations to link the port of San Pedro to potential mines in the Côte d'Ivoire and in Guinea for the **Bureau National d'Études Techniques et Développement** (Côte d'Ivoire).
- > Feasibility study for the construction of a 10-km rail spur, a loading facility and a marshalling yard at N'Dangara, for the **Compagnie des Bauxites de Guinée**.
- > Preliminary scoping study to evaluate the costs of transporting bauxite by rail between **Alcan's** proposed Ely Mine in Queensland, Australia and the port at Pennefather.
- > Feasibility study for a railway connection between **Aluminerie Alouette's** storage plant and its bulk maritime terminal located at the Port of Sept-Îles in Canada.
- > Concept study for the construction and operation of a new railway line to transport iron ore in Guinea, for the **Société des mines de fer de Guinée**.



## ENGINEERING, TENDERING & CONSTRUCTION SERVICES

- **Conceptual design of mining railways**
- **Alignment optimization for cost minimization and operational enhancement**
- **Detailed design**
- **Contracting strategy services (tendering, evaluation and award)**
- **Construction supervision**

## PROJECTS



- > Engineering, operational and technical assistance services provided to **Global Alumina**, in Guinea.
- > Detailed design of a new 2,200-km line for the North South railway in Saudi Arabia, including preparation of tender documents for construction, track alignment study, operating plan, functional specification of systems and rolling stock, and economic and financial evaluations, for **Saudi Arabia Ministry of Finance**.
- > Design of 2 km of mine haul road, including a crossing of the Pora River and of the railway which connects the Sangaredi mine to the port at Kamsar, Guinea for the **Compagnie des Bauxites de Guinée**.
- > **Kuantan – Kerteh Railway** design of 100-km railway in Malaysia for the transport of petrochemical products. Preliminary engineering for the construction of a new electrified singletrack railway line on a double track platform and for an associated maintenance road.
- > Detailed engineering for a new 10-km rail line to access a future bauxite loading site located on the N'Dangara plateau near Sangaredi, Guinea, for the **Compagnie des Bauxites de Guinée**.

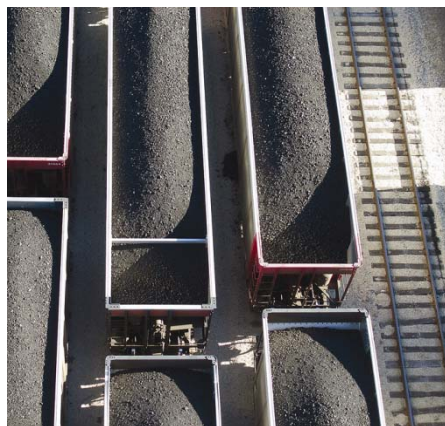
# TECHNICAL SERVICES

- **Increasing railway capacity and tonnage (track and bridges)**
- **Inspection services, including infrastructure maintenance and rehabilitation planning**
- **Signalling and telecommunications**
- **Rolling stock and workshop:**
  - Fleet replacement strategy
  - Fleet procurement plans
  - Workshop design
  - Maintenance planning and program implementation
- **Development of maintenance and engineering manuals**
- **Engineering for special projects and expansion**

## PROJECTS

- > Rehabilitation of 531 ore wagons for the **Compagnie des Bauxites de Guinée**.
- > Needs analysis for the **Quebec North Shore & Labrador Railway** (Canada) locomotive fleet.
- > Assistance to the **Quebec North Shore & Labrador Railway** in the engineering, tendering, and installation of new railway signalling equipment.
- > Technical assistance for the selection of a new model of locomotive to replace part of **Quebec North Shore & Labrador Railway's** existing fleet.
- > Expertise provided to **Quebec North Shore & Labrador Railway** regarding general maintenance of the track infrastructure.
- > Detailed evaluation of the Ghana Railway in order to propose actions and minimize operating costs for the **Bauxite Company of Ghana** and the **Manganese Company of Ghana**.
- > Preliminary design studies aimed at improving the capacity of freight cars over 80 tonnes on Morocco's railway phosphate lines for the **Office National des Chemins de fer du Maroc**.
- > Detailed design and layouts for the modification of **Société Nationale Industrielle et Minière's** (Mauritania) car bodies to increase their capacity.
- > Elaboration of a three-year action plan, including an operating budget, as well as a long-term investment program for locomotives and ore wagons, for the **Compagnie des Bauxites de Guinée**.
- > Factory inspection of 275 bogies for mineral cars manufactured in Brazil, for the **Société Nationale Industrielle et Minière** (Mauritania).
- > Provision of expertise to solve problems related to vehicle dynamics and excessive wheel wear, for the **Société Nationale Industrielle et Minière** (Mauritania).
- > Assessment of the remaining life of **Quebec Cartier Mining Company's** MLW M636 type locomotive fleet and of the future availability of spare parts.
- > Preparation of tender documents, including technical specifications, for the selection of a contractor for the installation of a complete telecommunications network for the **Quebec Cartier Mining Company** (Canada).
- > Development of a 10-15-year telecommunications master plan for the **Quebec Cartier Mining Railway Company** (Canada).
- > Evaluation and analysis of the condition of electrical locomotives and freight cars for **INCO Mining** (Canada).
- > Assistance to the **Quebec Cartier Mining Company** (Canada) in identifying the combination of infrastructure and rolling stock to minimize the cost of transporting 16 million tons of traffic per year.
- > Assistance to **Quebec Iron and Titanium (QIT)** (Canada) in a technical and economic assessment for the selection of 100-tonne ore hopper cars.
- > Assistance to **Guinea Alumina Corporation** with all rail-related aspects of their Guinean alumina refinery project.

Improving  
Railway Efficiency  
to Maximize  
Mine Profitability



## CLIENTS

Alcoa Inc.  
United States

Alcan Inc.  
Canada

Aluminerie Alouette Inc.  
Canada

Aluminpro Inc.  
Canada

Asia Energy Plc.  
Bangladesh

Baffinland Iron Mines Corporation  
Canada

Bauxite Company of Ghana  
Ghana

Bumigene Inc.  
Canada

Bureau National d'Études Techniques  
et Développement  
Côte d'Ivoire

Compagnie des Bauxites de Guinée  
Guinea

Global Alumina  
Guinea

Guinea Alumina Corporation  
Guinea

Inco Mining  
Canada

Manganese Company of Ghana  
Ghana

Office National des Chemins  
de Fer du Maroc  
Morocco

Petronas  
Malaysia

Public Investment Fund  
(Ministry of Finance)  
Saudi Arabia

Quebec Cartier Mining Company  
Canada

Quebec Iron and Titanium  
(member of Rio Tinto)  
Canada

Iron Ore Company of Canada  
(Quebec North Shore &  
Labrador Railway)  
Canada

Roberval Saguenay Railway  
Canada

Rusal (for Fria, Guinea)  
Russia

Société nationale industrielle  
et minière  
Mauritania

Westmar  
Canada

## OPERATIONS PLANNING & ASSISTANCE

- Rules development
- Railway safety audits
- Strategic transportation planning
- Operations assistance
- Qualified railway personnel sourcing
- Training of personnel (drivers training, rules instruction, and all other railway specializations)

## PROJECTS

- > From 1995 to 2001, provision of on-going railway engineering, operations, maintenance, and management services to the **Compagnie des Bauxites de Guinée** in Guinea, a bauxite mining railway jointly owned by the Government of Guinea, Alcoa and Alcan, transporting 15 million tons of bauxite yearly.
- > Determination of optimal train configurations for the transport of bauxite and alumina between mine sites and the Port of Kamsar in Guinea, using train simulations, for **Global Alumina**.
- > Training of **Roberval Saguenay Railway's** (Canada) maintenance-of-way employees.
- > Development and delivery of locomotive driver training courses for the **Compagnie des Bauxites de Guinée**.
- > Design and delivery of two module training programs on locomotive and rolling stock maintenance to the **société nationale industrielle et minière's (SNIM)** (Mauritania) mechanical and electrical engineers. Training of SNIM's personnel in the use and maintenance of "end of train" units.
- > Locomotive driver training course for **Société nationale industrielle et minière** (Mauritania).
- > Preparation of a training program for re-certification of **Roberval-Saguenay Railway's** (Canada) employees.
- > Development of an operating plan for the North-South Railway line in Saudi Arabia, for the **Public Investment Fund**.

## RAILWAY ANALYTICAL & ENGINEERING TOOLS / MODELS

- Infrastructure cost estimating model (standardized railway costing model)
- Train Performance Calculator (TPC) – (run times, fuel consumption, etc.)
- Models for financial evaluation (including traffic, capital and operating costs)
- Alignment optimization model (minimize earthworks costs and increase operational efficiency)
- Railway capacity simulation model
- Mining rail operations planning model (axle load, fleet size, frequency, etc.)



Serving mining railways around the world

1100 René-Lévesque Blvd. West  
10th Floor  
Montreal (Quebec)  
Canada H3A 1M8

Phone: 1 514 985-0930  
Fax: 1 514 985-0929  
ggenin@canarail.com  
www.canarail.com

For more information, please contact Mr. Guillaume Genin, Vice President, Business Development at the following address: ggenin@canarail.com