



**Freight
and
Mining**



Transit

**Rolling
Stock**



Freight & Mining Expertise

We offer a comprehensive range of services to ensure that we provide reliable and efficient transportation to support their associated mining :

- Planning
- Engineering
- Implementation
- Operation
- Management

RAILWAY ENGINEERING, TECHNICAL AND MANAGEMENT SERVICES FOR THE MINING INDUSTRY



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 ongoing operations. SYSTRA Canada (formerly 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 SYSTRA Canada 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 practises for rolling stock, and/or technical support to identify the most efficient ways of optimizing equipment reliability.

SYSTRA Canada 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
 - Conceptual design of mining railways

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.
- Feasibility study comprised the engineering and cost estimate for the construction of a multi-user railway for the purpose of transportation iron ore concentrate over 300 km from the Labrador through to the port of Pointe Noire on the St-Laurence River for **La Société ferroviaire du Nord Québécois (SFNQ)**. The railway would initially carry 20 million metric tonnes per year from multiple mine sites.
- Scoping study for the transportation of iron ore in Gabon for **GENMIN**.
- 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 lines and 115 km of new railways 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 (BNETD)** - Côte d'Ivoire.
- Estimation of railway costs related to the development of an integrated alumina complex for **Alcoa**.
- Feasibility Study of a new rail solution linking the Transgabonais to the Maboumine site, in Gabon for **COMILOK**.
- 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 (CBG)**.
- 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.
- Design of **Rusal's Mine and Port Terminals** and their rail connections for the Dian-Dian Project - Guinea.
- 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, PROCUREMENT & CONSTRUCTION SERVICES

- Detailed design
 - Alignment optimization for cost minimization and operational enhancement
 - Contracting strategy services (tendering, evaluation and award)
 - Construction supervision
 - Engineering, Procurement, Construction Management (EPCM)



PROJECTS

- EPCM for delivery of infrastructure upgrades for **Chemin de fer de Boké** (Guinea) to double railway capacity.
- EPCM mandate for the delivery of the 30 km Kerail Project in Scherfferville (Canada) for **Tata Steel Minerals Canada / Kenrail**.
- 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**.
- **Kuantan – Kerteh Railway** design of 100 km railways in Malaysia for the transport of petrochemical products. Preliminary engineering for the construction of a new electrified single-track railway line on a double track platform.
- 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 (CBG)**.
- 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 (CBG)**.

TECHNICAL SERVICES

- Increasing railway capacity and tonnage (track and bridges)
- Inspection services including infrastructure maintenance and rehabilitation planning
- Signalling and telecommunications
- Rolling stock and workshops:
 - 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

- Modification of 550 ore wagons for the implementation of the rotary dumping solution for the **Compagnie des Bauxites de Guinée (CBG)**.
- Rehabilitation of 531 ore wagons for the **Compagnie des Bauxites de Guinée (CBG)**.
- 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**.
- 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 (CBG)**.
- 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)**.
- Track inspection and derailment investigation services for **Noranda Bauxite (Jamaica)**.
- 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.
- Procurement of a new Rail dispatching system for **SETRAG (Gabon)**.
- Detailed design and layouts for the modification of **Société Nationale Industrielle et Minière's** (Mauritania) car bodies to increase their capacity.



Improving railway efficiency to maximize mine profitability

CLIENTS

Alcan Inc., Canada
 Alcoa Inc., United States
 Aluminerie Alouette Inc., Canada
 Aluminpro Inc., Canada
 Asia Energy Plc., Bangladesh
 Baffinland Iron Mines Corporation, Canada
 Bauxite Company of Ghana, Ghana
 Bureau national d'études techniques et développement, Côte d'Ivoire
 COMILOG, Gabon
 Champion Iron Mine, Canada
 Compagnie des Bauxites de Guinée, Guinea
 Global Alumina, Guinea
 Inco Mining, Canada
 Iron Ore Company of Canada (Quebec North Shore & Labrador Railway), Canada
 Kerail, Canada
 Labrador Iron Mines (LIM), Canada
 Labrador Iron Mines, 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
 Qatar Railway, Qatar
 Quebec Cartier Mining Company (ArcelorMittal), Canada
 Quebec Iron and Titanium (member of Rio Tinto), Canada
 Roberval Saguenay Railway, Canada
 Rusal (Guinea), Russia
 Tata Steel, Canada
 SETRAG/Camilog, Gabon
 Société nationale industrielle et minière, Mauritania

OPERATIONS PLANNING & ASSISTANCE

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

PROJECTS

- From 1995 (ongoing), provision of ongoing railway engineering, operations, maintenance, and management services to the **Compagnie des Bauxites de Guinée (CBG)** 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**.
- Development and delivery of locomotive driver training courses for the **Compagnie des Bauxites de Guinée (CBG)**.
- Training of SETRAG/Camilog employees (Gabon) on train accident investigations.
- Design and delivery of two module training programs on locomotives 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 courses for **Société Nationale Industrielle et Minière** (Mauritania).
- Assistance for the implementation of a multi-user operational agreement for **Rusal CBG / GAL** (Guinea) .
- Development of an operating plan for the North-South Railway line in Saudi Arabia, for the **Public Investment Fund**.
- Training of **Noranda Bauxite's** employees on maintenance of infrastructure (Jamaica).

RAILWAY ANALYTICAL & ENGINEERING TOOLS / MODELS

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

Serving mining railways
around the world