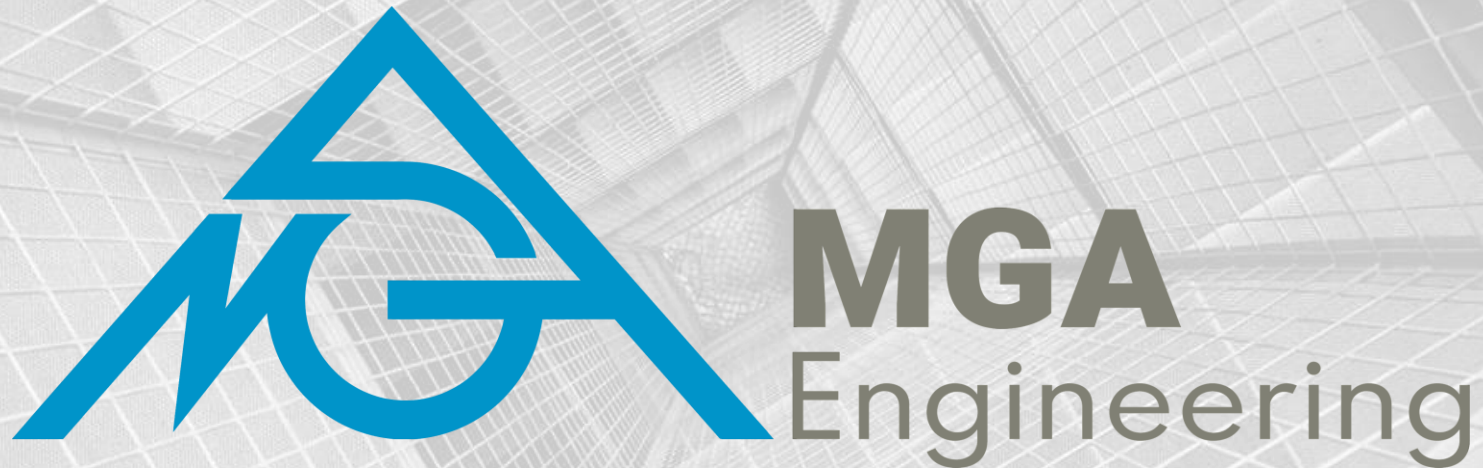


# MINING PORTFOLIO



**MGA Engineering Inc.**

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# ABOUT MGA

MGA Engineering Inc. is a master designer of structural and mechanical systems utilized across the globe in the marine, mining, infrastructure, and building sectors. Founded in 1996, the firm is headquartered in Calgary, Canada, and operates regional offices in Canada, USA, and Egypt. Throughout the decades, MGA has lent its expertise to asset owners & operators, and equipment manufacturers. MGA's portfolio of projects spans the globe, with a historical emphasis on the Americas, and a new focus on emerging markets in Africa, South East Asia, and Oceania.



# THE MINING GROUP

The Mining Group concentrates its expertise on a mine's bulk material handling and treatment equipment, its surface facilities and buildings, and its service infrastructure (rail, roads, ports, water, utilities). Bulk material handling anchors the Group's history and remains its market's point of entry. MGA will design, build, inspect, assess, certify, and audit these complex systems, as well as engineer life extension solutions for older installations.

The Group can be engaged at all post-exploration stages of a mine's development lifecycle, from feasibility & concept, and design definition to system engineering, to detailed design and construction (EPC, EPCM), and operational integrity. The Group can facilitate strategic introductions with Canadian investment and financing sources to non-Canadian clients.



# CLIENT SNAPSHOT



# ENGAGEMENT

## The Development Triad

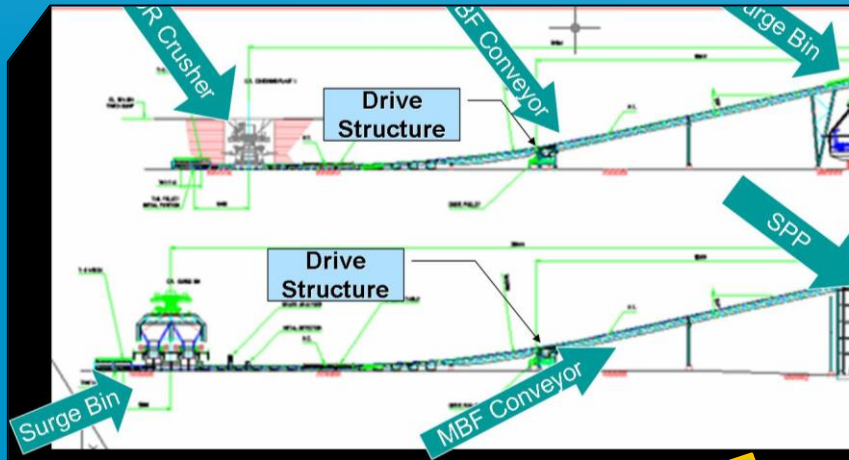
MGA begins its participation to a mine's development cycle after the completion of the exploration phase. The Mining Group typically assists owners and mine designers with solving the bulk equipment material handling and treatment equipment requirements. From there, the Group will undertake the conceptional, functional and ultimate detail design of the equipment for tendering (or supply them in some cases).

The second element of the development triad concerns the surface facilities and buildings needed for both construction and operation of the mine. The design work proceeds again in conjunction with the mine's designated EPC or EPCM contractor, or independently of it, including civil, foundation, and earthworks associated with these facilities. Building design will involve MGA's Building Group in all cases.

The third triad element encompasses the adjoining infrastructure located outside of the mine's boundary limits. These infrastructure components typically include rail and truck loading/unloading terminals and marine ports. The infrastructure components are executed by MGA's Infrastructure and Port Groups.

# THE WORKS

## I. Bulk Material Handling and Treatment Equipment



## II. Surface Facilities and Buildings



## III. Service Infrastructure





► **Typical engagements encompass:**

- Concepts: feasibility studies, equipment and layout options
- Definition: Selection, constraints, scoping (budgets & timelines)
- Conception: Design, layouts, execution planning
- Procurement: purchases, contracts, leases, logistics
- Realization: Fabrication, transportation, construction, erection, commissioning, certification, start-up
- Operations: Field support, troubleshooting, modifications
- Green and brownfield modifications, expansions, and senescence.

# PROJECT INVOLVEMENT

# I. BULK MATERIAL HANDLING AND PROCESSING

## CAPEX: New equipment

Design, Design-Build, Design-Certify)

## OPEX-A: Equipment in operation

(repairs, troubleshooting, modifications, alterations, senescence)

## OPEX-B: Inspection, Testing & Certification

(maximization of economic life of operating assets)

**Over the decades, MGA has worked with major Original Equipment Manufacturers (OEM) including Takraf, ThyssenKrupp, PHB, FAM, MWS, FL Smidth, Shinhan, and Sandvik.**

### BULK TRANSFER

- Single-boom spreaders
- Mobile stacking bridges
- Transport crawlers
- Stacker and reclaimers (single & combined)
- Bucket wheel reclaimer (boom & bridge)
- Scraper, drum, and portal reclaimers
- Portal and bridge-type scraper reclaimers
- Ship loaders & unloaders
- Grab type ship unloader
- Circular storage with stacker/bridge reclaimer

### BULK TREATMENT

- Crushing plants
- Breakers and high-pressure grinding rolls
- Roll crushers and double roll crushers
- Belt linear screens
- Hard rock sizers
- Slurries plant and tailings
- Primary separation and flotation cells
- Granulators
- Vacuum belt filters for dewatering

### EXCAVATORS

- Bucket chain excavators
- Bucket wheel excavators

### TRANSPORT

- Apron feeders
- Belt conveyors
- Belt feeders
- Mobile conveyor bridges
- Mobile transfer conveyors
- Tube conveyor
- In-plant conveyor systems
- Pipe conveyor systems
- Steel belt conveyors

### FACILITIES & Buildings

- Wagon / truck loading
- Wagon unloading / tripper
- Rapid train load-out station
- Storage pits
- Tanks and reservoirs
- Pressure vessels and bullets
- Process piping
- Pipe racks
- Steel structures



## OPEX Type I: Keep the asset operating profitably

- ▶ Assessments of structural and mechanical integrity
- ▶ Failure analysis and prevention
- ▶ Fracture and fatigue assessments, detection, and mitigation
- ▶ Design of alterations, modifications, upgrades, and repairs
- ▶ Design assessments of performance enhancements, capacity increases, reliability improvements, and automation opportunities
- ▶ Bottlenecks, inefficiencies, low reliability challenges

# OPEX TYPE I EXPERTISE

## OPEX Type II: Extend the economic life of assets:

- ▶ In-situ inspections of equipment under static and operating conditions for detection of structural, mechanical, and operational problems, concerns or issues.
- ▶ Corrosion, erosion and structural degradation detection, and progress monitoring
- ▶ Testing, troubleshooting, and identification of remedial options & opportunities for improvements and/or degradation mitigation
- ▶ Certification of operational & structural compliance to Codes, Standards, and Permit requirements
- ▶ Risk mitigation: risks of failure, to productivity, to health, safety and the environment, to reliability, to budgets, and to shareholders' returns on investment.
- ▶ Design options for extending the economic life of operating or idle equipment.

# OPEX TYPE II EXPERTISE



# CONVEYORS



# STACKERS AND RECLAIMERS





# PRIMARY CRUSHING SYSTEMS





# SLURRY PREPARATION PLANTS



## II. SURFACE FACILITIES AND BUILDINGS

### INDUSTRIAL FACILITIES

- Hoppers and chutes
- Ore separation
- Surge bins
- Wagon / truck loading
- Wagon unloading / tripper
- Rapid train load-out station
- Warehouses and fab shops
- Vehicle repairs and housing
- Tanks, Silos, and vessels
- Racks and piping
- Power / Heat stations

### BUILDINGS

- Administration and offices
- Training centres
- Exercise and aquatic centres
- Passenger / Cargo terminals
- Multimodal terminals
- Commercial and shops
- Foundations and undergrounds
- Blast-resistant structures
- Towers and guard sheds
- Police and fire stations

### CIVIL AND UTILITIES

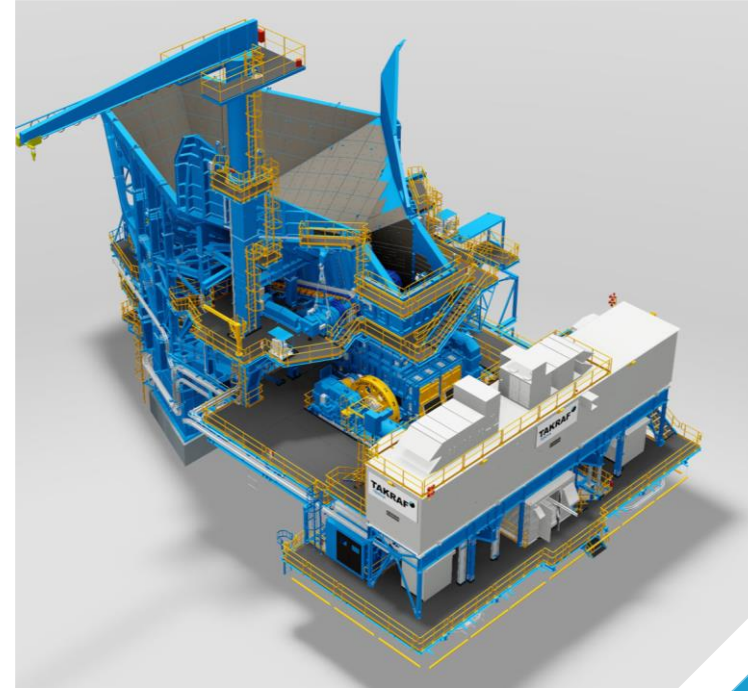
- Tailings and ponds
- Reservoir and storage
- Access and Urban Roads
- Vehicular and pedestrian bridges
- Foundations and piles
- Storage pits and stockpiles
- Site Grading, Earth Balance
- Earth retention systems
- Trenches and dams
- Trenchless crossings and tunnels
- Grading and roadways
- Walls, gates, and fencing

### WATER AND WASTE WATER

- Drainage and stormwater
- Treatment (potable, grey and waste)
- Pipelines and distribution
- Metering and lift stations
- Sewage collection systems
- Force mains & siphons
- Storage and reservoirs
- Tunnels and trenchless
- Intakes & outfalls
- Pump and lift stations

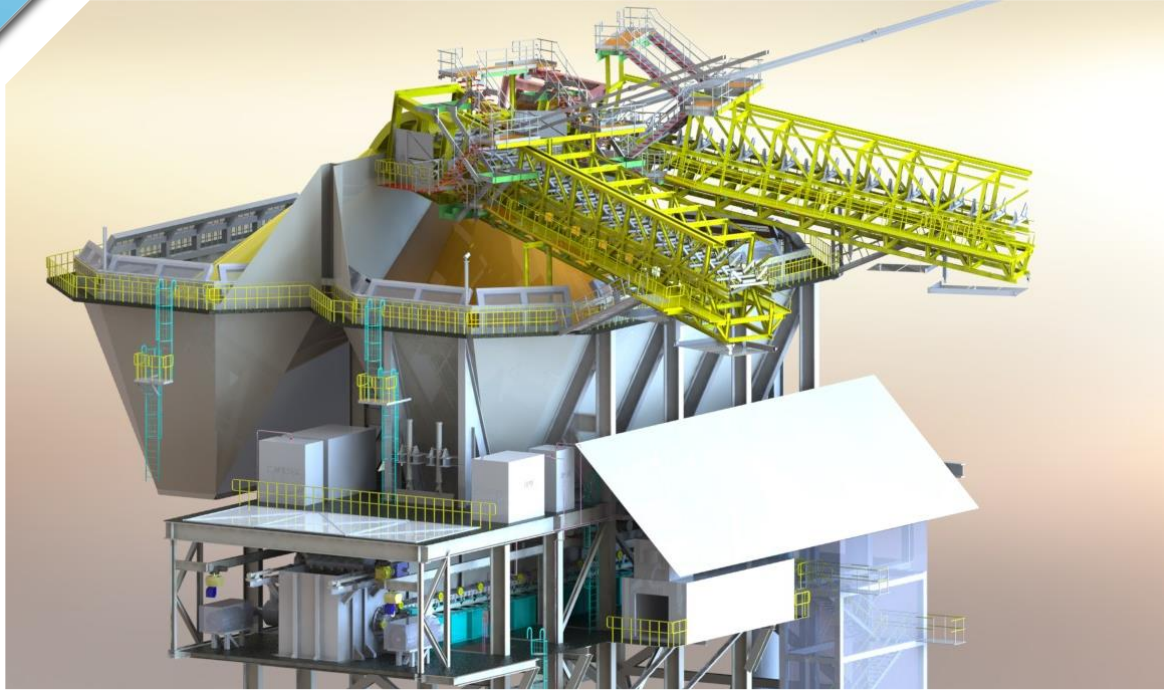


# PRIMARY SEPARATION CELLS



# HOPPERS





# SURGE FACILITIES



# MATURE FINE TAILINGS CENTRIFUGING PLANT





# EARTH RETAINING STRUCTURES





# BLAST RESISTANT STRUCTURES

### III. SERVICE INFRASTRUCTURES

#### PORTS AND WATERWAYS

- Ship loaders and unloaders
- Stackers / reclaimers
- Conveyors
- Weigh stations
- Surface facilities
- Train /truck loading / unloading
- Terminals (cargo + passengers)
- Storage and stockpiling
- Silos, tanks, and reservoirs
- Surface facilities and buildings

#### TRANSPORT

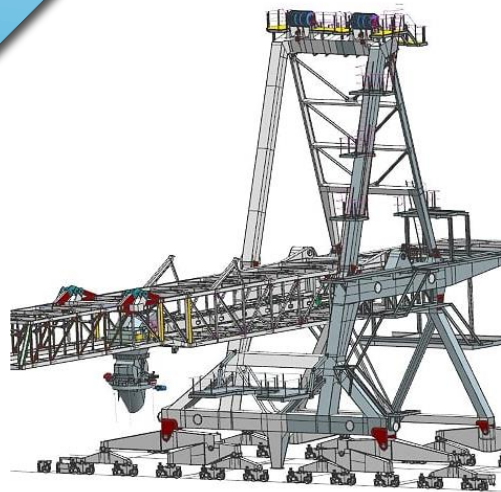
- Rail spurs and stations
- Rail / truck loading & unloading
- Rail tripper
- Bus terminals
- Weigh stations
- Wash bays

#### CIVIL AND UTILITIES

- Access and Urban Roads
- Vehicular and pedestrian bridges
- Foundations and piles
- Site Grading, Earth Balance
- Earth retention systems
- Trenches and dams
- Trenchless crossings and tunnels
- Grading and roadways
- Power and gas distribution

#### WATER AND WASTE WATER

- Drainage and stormwater
- Treatment (potable, grey and waste)
- Pipelines and distribution
- Metering and lift stations
- Sewage collection systems
- Force mains & siphons
- Storage and reservoirs
- Tunnels and trenchless
- Intakes & outfalls
- Pump and lift stations



# SHIPLOADERS

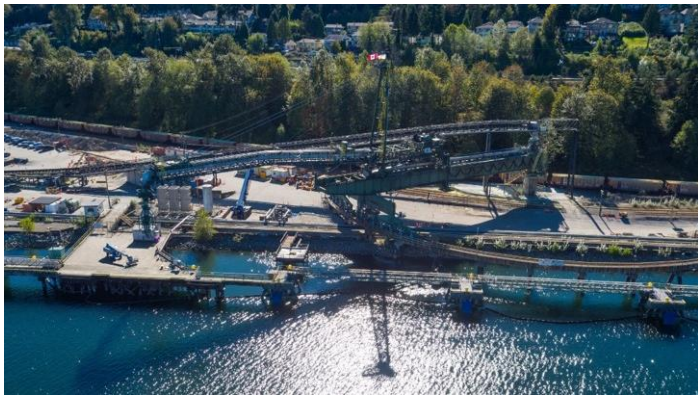
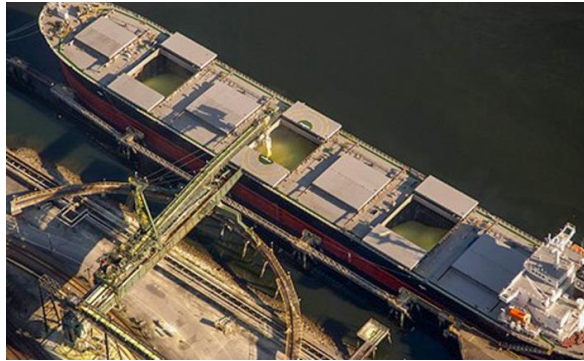




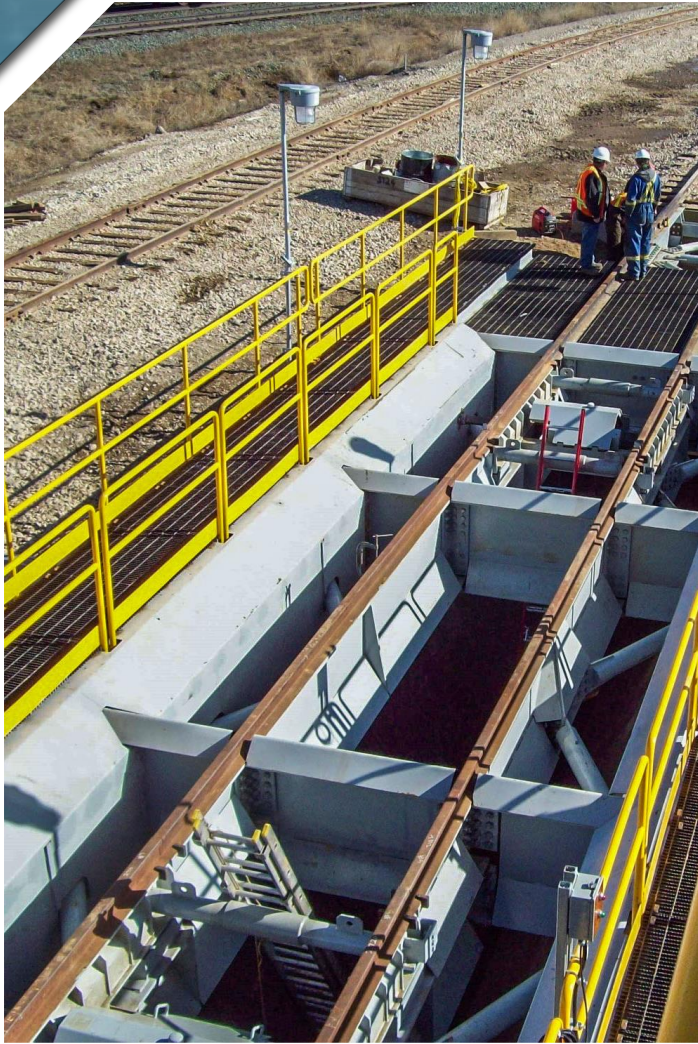
# SHIP UNLOADERS



# TERMINALS







RAIL



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