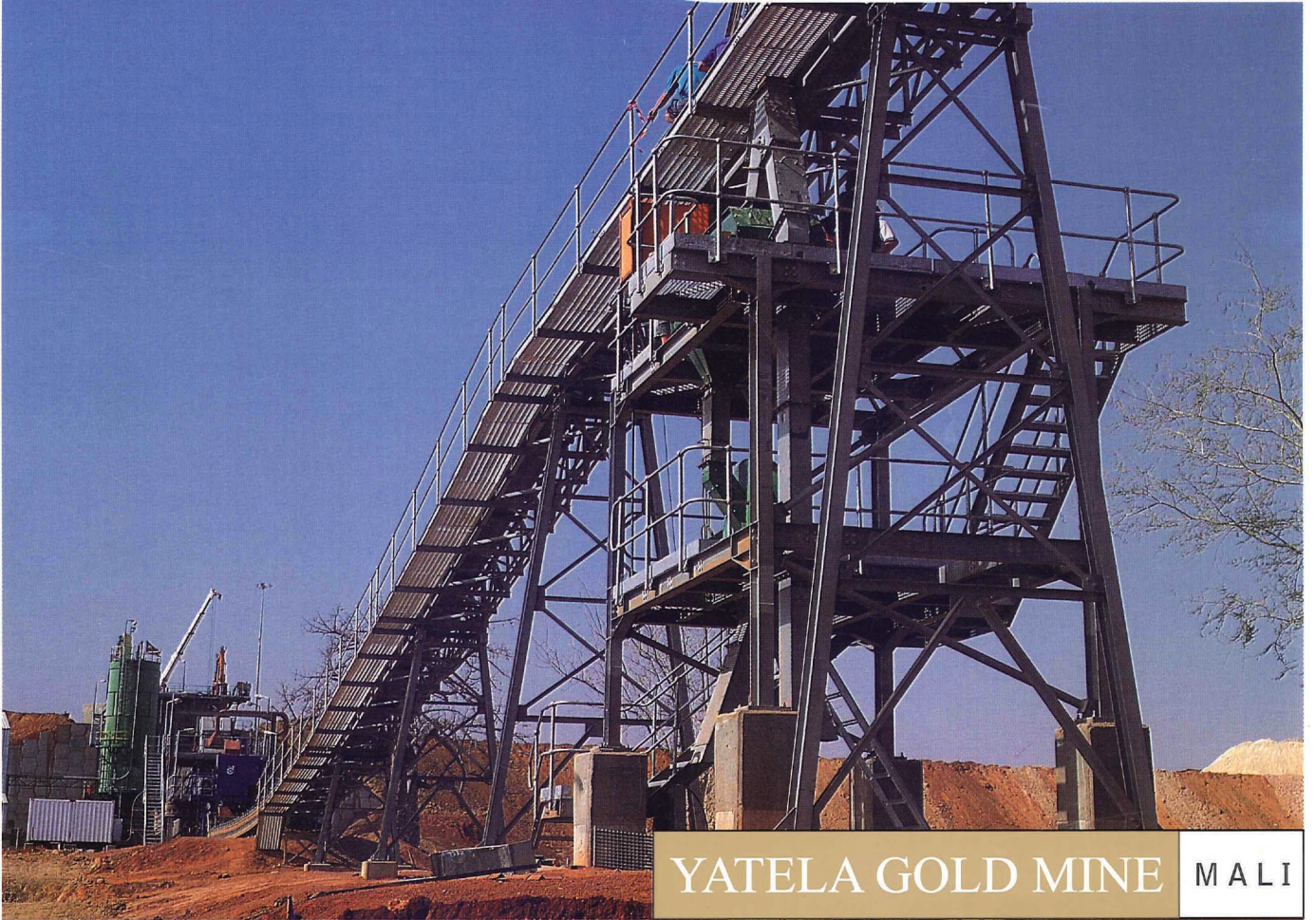




LIMITED

INTEGRATED ENGINEERING SOLUTIONS



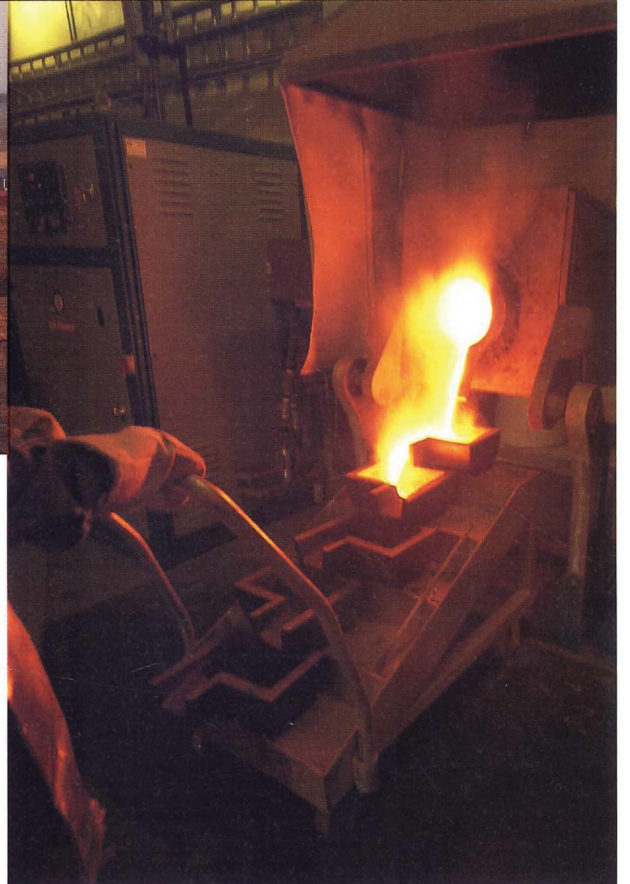
YATELA GOLD MINE MALI

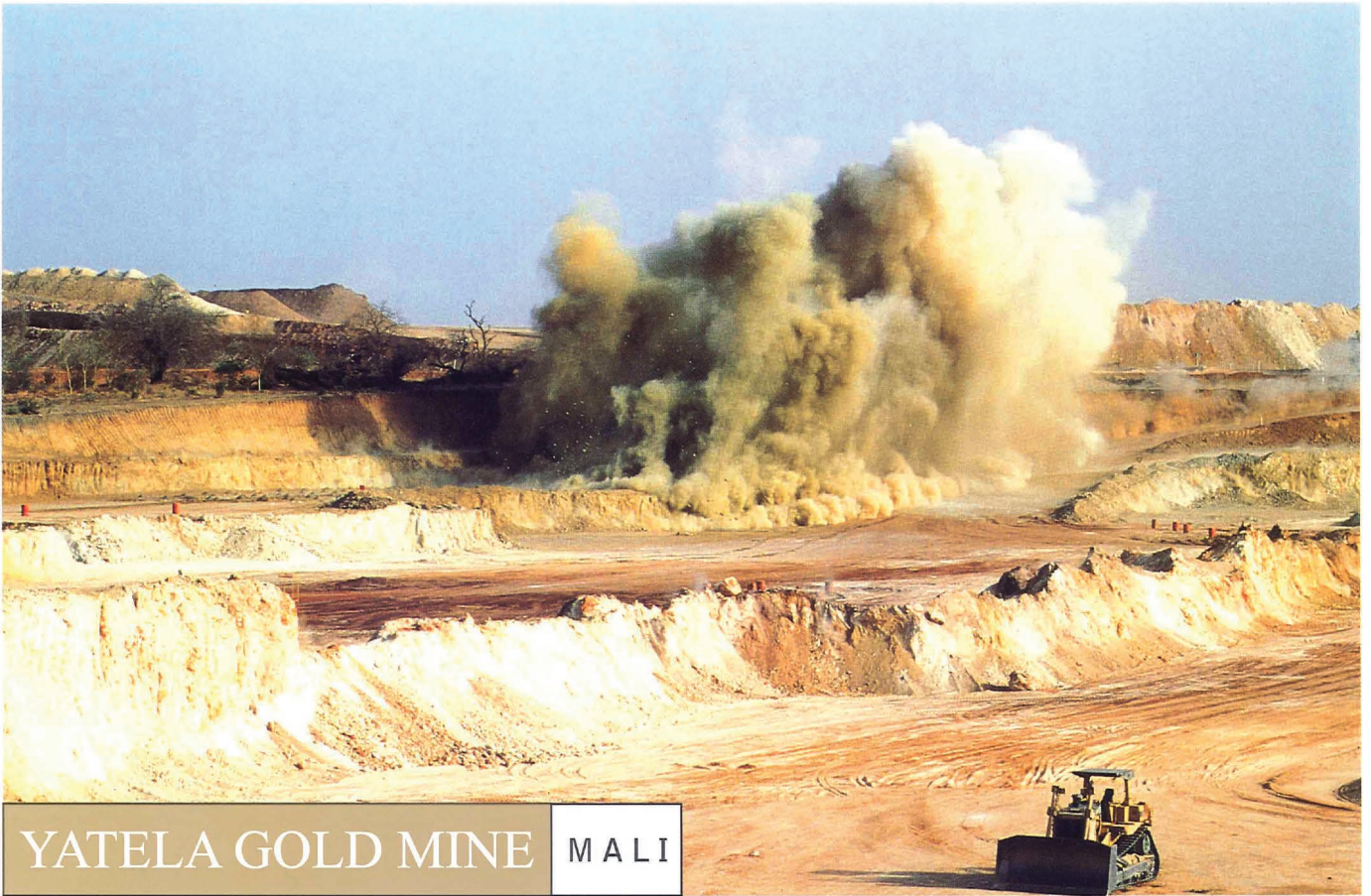


MAED's involvement with the West Africa gold mining industry has gone from strength to strength with the successful completion of the Yatela gold mine heap leach project.

Anglo Gold's second, and currently second largest, mine in Mali is situated 25km north west of Sadiola Hill gold mine in the Kayes region of that country.

Construction equipment and materials were shipped via Abidjan in the Ivory Coast or Dakar in Senegal. The closest port to the mine is Dakar, which is 750kms due west.



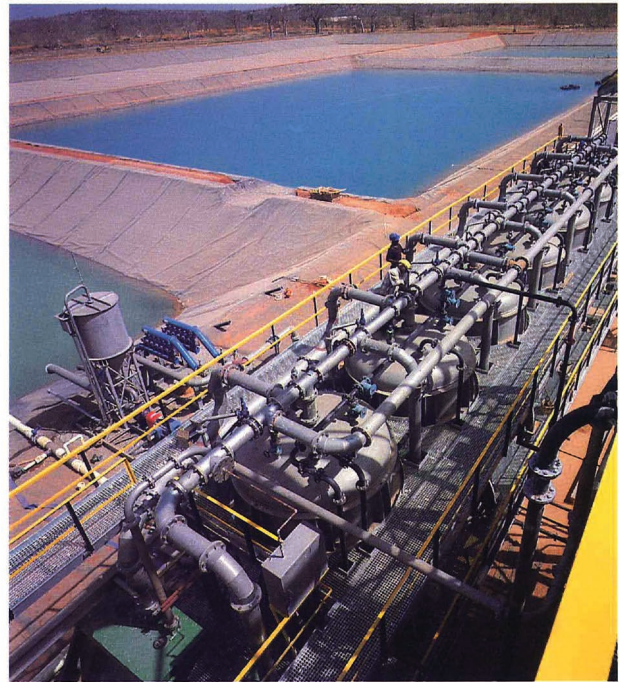


YATELA GOLD MINE MALI

From a "greenfields" site to fully operational mine, our expertise was employed in the following areas:

- Housing estate and recreation club
- Crushing and conveying
- Agglomeration
- Leach pad and ponds
- Carbon in Solution contactors
- Carbon movement and regeneration
- Electrowinning
- Mine security and access control
- Workhouse, workshops and administration buildings

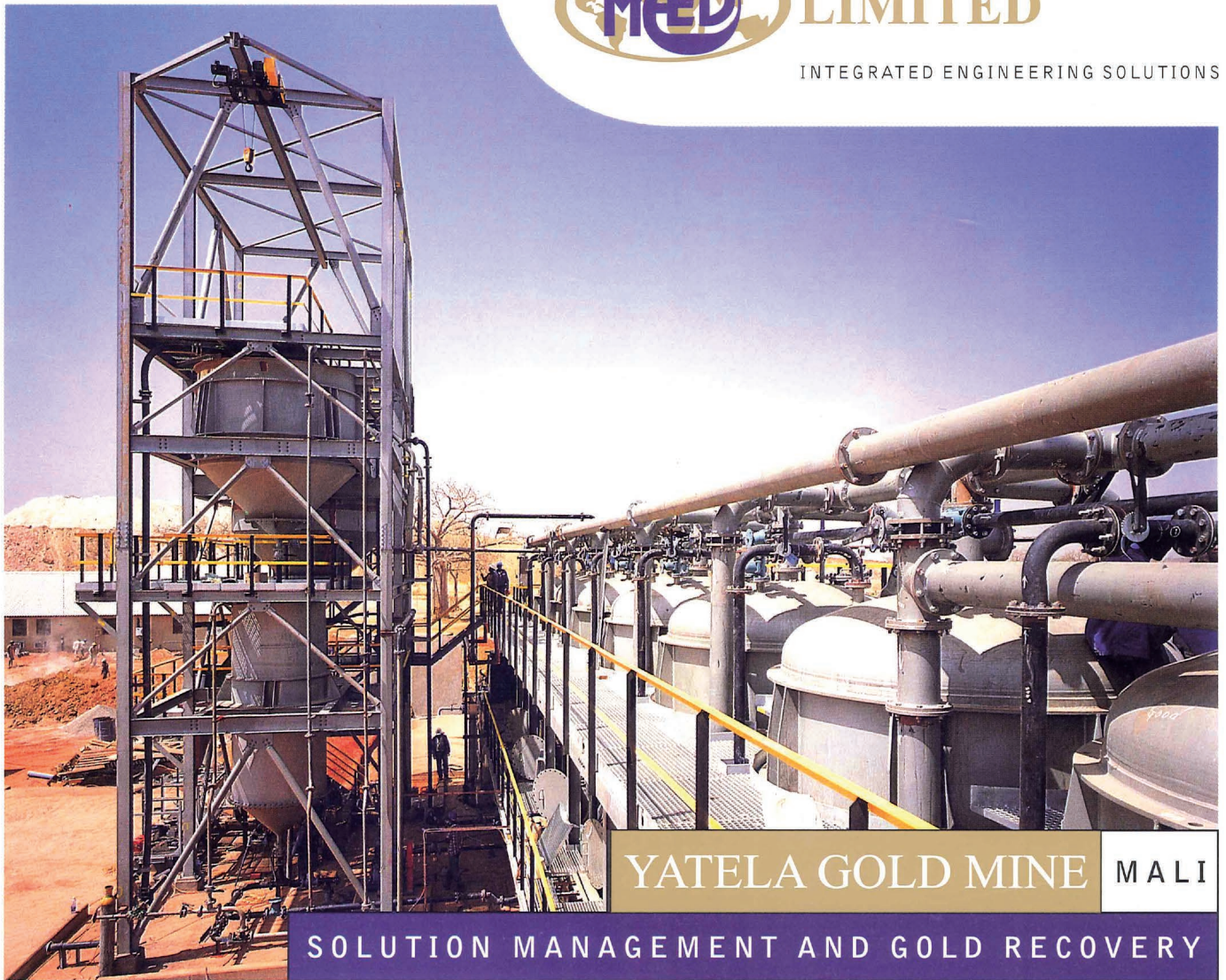
The first gold from Yatela was poured on 9 May, 2001 – one month ahead of schedule. The mine was fully constructed, below budget, at a total cost of US\$73m.





MAED LIMITED

INTEGRATED ENGINEERING SOLUTIONS



YATELA GOLD MINE MALI

SOLUTION MANAGEMENT AND GOLD RECOVERY

PADS, PONDS, SOLUTION MANAGEMENT AND GOLD RECOVERY

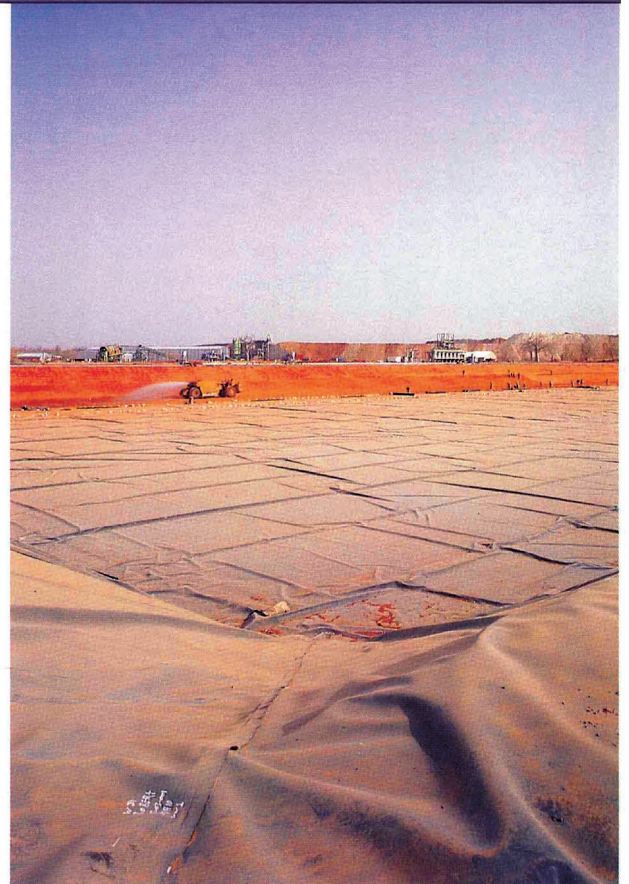
The Yatela project is a two-stage leach process incorporating a primary and secondary leach cycle. This enrichment process reduces the volume of solution reporting to the gold recovery section at an increased gold tenor, hence increasing recovery plant efficiencies.

LEACH PADS AND PONDS

MAED were contracted to undertake the considerable earthworks involved in preparing the initial four pads and four ponds that would be used for solution management.

Each pad was approximately 850m long with #1 cell being 100m wide and numbers 2 to 4 being 70m wide.

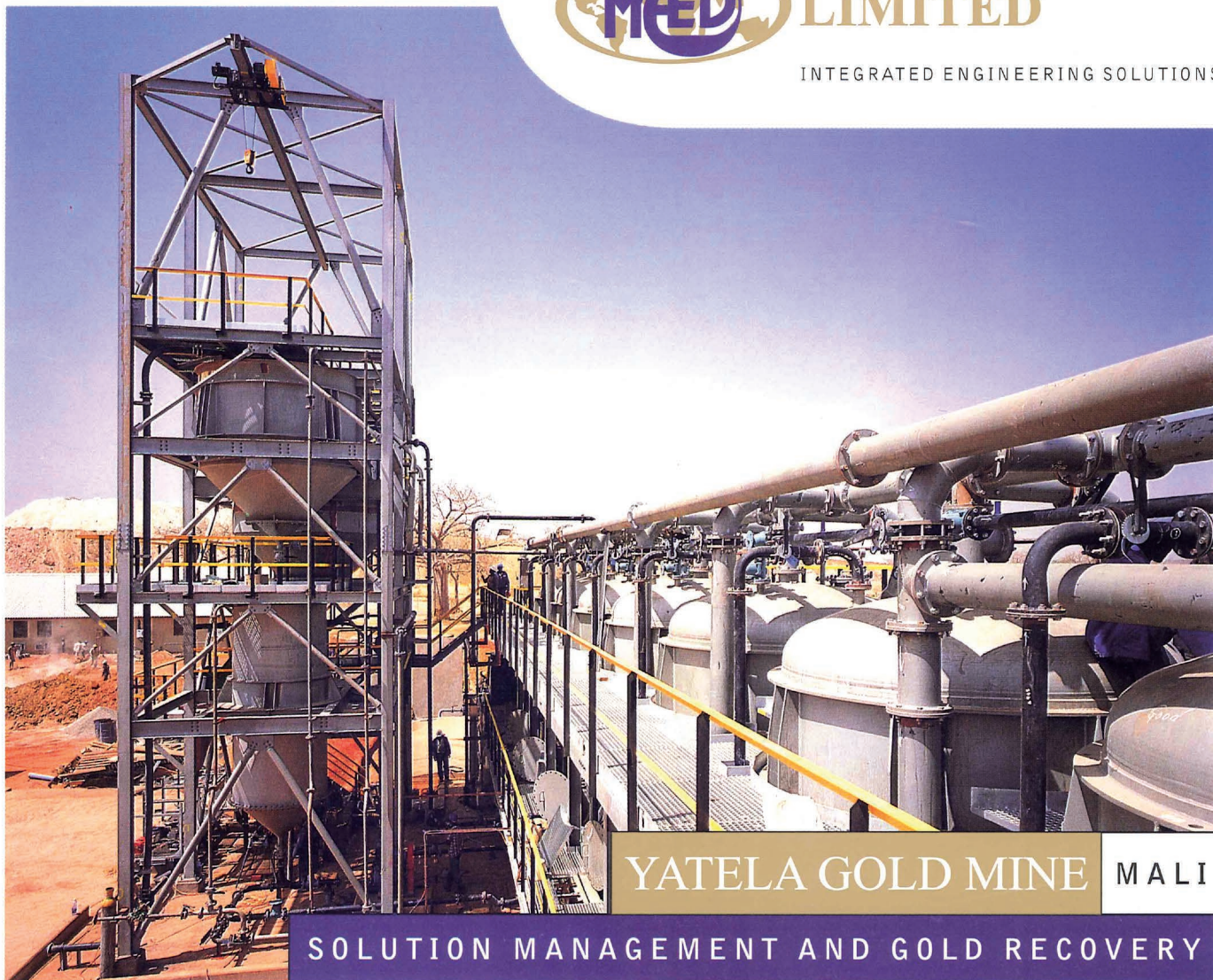
Approximately 270,000m² of 1.5mm thick MDPE lining was installed and welded over the pad earthworks to prevent solution loss. A network of drainage pipes was constructed beneath the head to collect the leach solution and transfer it to the ponds.





MAED LIMITED

INTEGRATED ENGINEERING SOLUTIONS



YATELA GOLD MINE MALI

SOLUTION MANAGEMENT AND GOLD RECOVERY

PADS, PONDS, SOLUTION MANAGEMENT AND GOLD RECOVERY

The Yatela project is a two-stage leach process incorporating a primary and secondary leach cycle. This enrichment process reduces the volume of solution reporting to the gold recovery section at an increased gold tenor, hence increasing recovery plant efficiencies.

LEACH PADS AND PONDS

MAED were contracted to undertake the considerable earthworks involved in preparing the initial four pads and four ponds that would be used for solution management.

Each pad was approximately 850m long with #1 cell being 100m wide and numbers 2 to 4 being 70m wide.

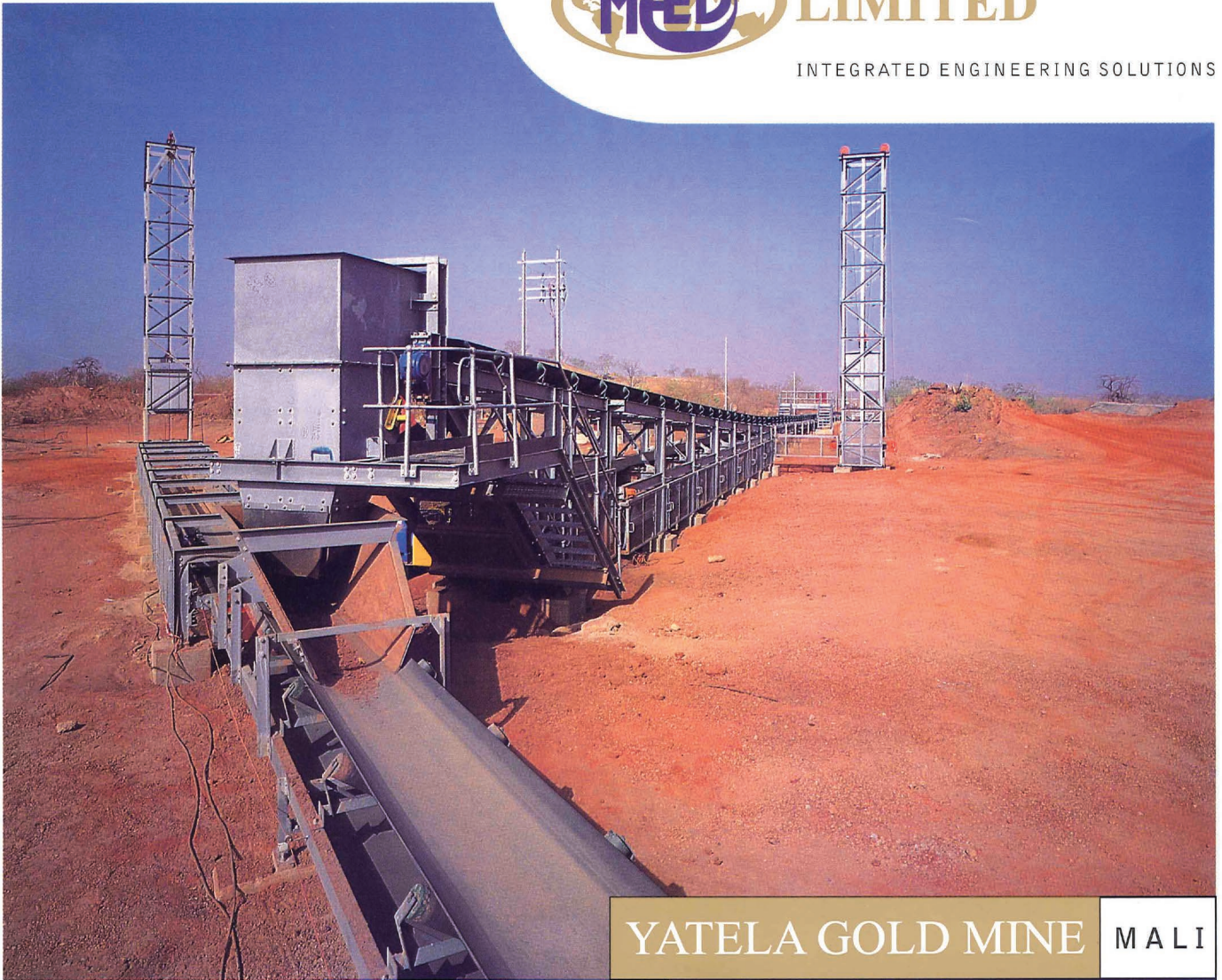
Approximately 270,000m² of 1.5mm thick MDPE lining was installed and welded over the pad earthworks to prevent solution loss. A network of drainage pipes was constructed beneath the head to collect the leach solution and transfer it to the ponds.





LIMITED

INTEGRATED ENGINEERING SOLUTIONS



YATELA GOLD MINE MALI

CRUSHING AND CONVEYING

BACKGROUND

With the acquisition of the Yatela deposit to supplement the SADEX discovery, AngloGold proceeded with the development of the Yatela Gold Mine in 2000. As an oxide ore body, it was perfectly amenable to the heap leach extract process.





YATELA GOLD MINE MALI

CRUSHING AND CONVEYING

SCOPE OF WORK

MAED was charged with the procurement and construction management of the 2.5million tons per annum heap leach project. Due to the nature of the ore, crushing and agglomeration were required prior to the heap-leaching process.

CRUSHING AND CONVEYING

The oxide ore was required to be crushed to 80% - 50mm to allow the cyanide solution in the heap-leach to percolate through the heap.

The ore from the pit was screened on grizzly prior to storage in the 150m³ primary bin lined with 16mm thick 3CR12 plates. A pedestal-mounted rock-breaker capable of breaking 1500mm cube rocks was installed to cater for the oversize material.

The primary 750 3-tooth mineral sizer capable of handling peak throughput of 1000tph was fed by a 2m wide x 9.14m centred apron feeder.

Crusher ore is fed to the 625 five-tooth segment triple length mineral sizer via a 1200mm wide primary conveyor.

THROUGHPUT

The plant was constructed to cater for the spillage-free handling of a nominal throughput of 610tph (wet) while allowing maximum throughput of 1000tph.



**YATELA GOLD MINE** MALI**CARBON HANDLING UPGRADE****SADIOLA CARBON HANDLING UPGRADE**

The synergies and economies of scale derived by access to Sadiola Gold Mine's infrastructure are critical to the viability of the Yatela Gold Mine.

To utilise the spare elution capacity at Sadiola Gold Mine, MAED was contracted to upgrade the existing plant to allow carbon to be treated on a toll basis. New carbon handling, regeneration and electro-winning facilities were required to achieve this.

CARBON HANDLING

MAED installed tanker off-loading facilities and upgraded the measurement systems feeding into the existing elution plant. A new carbon storage and tanker loading facility was erected to cater for the removal of carbon from Sadiola by tanker to the Yatela site. Storage for 16T of regenerated carbon was allowed.





YATELA GOLD MINE MALI

CARBON HANDLING UPGRADE

CARBON REGENERATION

MAED was contracted to erect a new regeneration building to cater for the treatment of Yatela carbon prior to despatch. This included a 32m³ storage tank ahead of the 45Kg/hr diesel fired regeneration kiln. Special carbon pumps transferred the regenerated carbon from the 16m³ stainless steel quench tank to the regenerated carbon tank.

ELECTROWINNING UPGRADE

A totally independent electro-winning system was installed within the infrastructure of the smelt-house at Sadiola. This involved integrating Yatela solution instrumentation systems with the current control philosophy.

Separate solution storage tanks were installed coupled with automated pumping sequencers to feed the four new electro-winning cells.

Extremely close liaison was required between MAED and Sadiola staff to successfully couple the new plant to the old without loss of production.





MAED LIMITED

INTEGRATED ENGINEERING SOLUTIONS



YATELA GOLD MINE MALI

AGGLOMERATION AND STACKING

SCOPE OF WORK

To enable free flow of leachate through the heap and to prevent channelling of the solution, MAED was charged with the installation of an agglomeration drum subsequent to the crushing process. A series of conveyors was necessary to transport the material to the stacker, which evenly distributed the agglomerated ore onto the heap.

AGGLOMERATION

MAED installed a 3.6m diameter x 10m long drum with a shell thickness of 35mm. This was driven by double drive 110KW motors through a helical gearbox.

Throughput could be varied by adjusting the drum angle between 3°- 9°. This was achieved by installing two actuators capable of lifting 35 tons each through a travel of 850mm.

Two submersible pumps located in the intermediate pond were installed to pump solution to the agglomeration drum spray system to achieve moisture content of 17%.





YATELA GOLD MINE MALI

AGGLOMERATION AND STACKING

MAED installed an automated cement addition system feeding into the agglomeration drum to act as a binding agent to produce a pellet with the required mechanical and physical properties to facilitate optimal heap leach recoveries and heap stability.

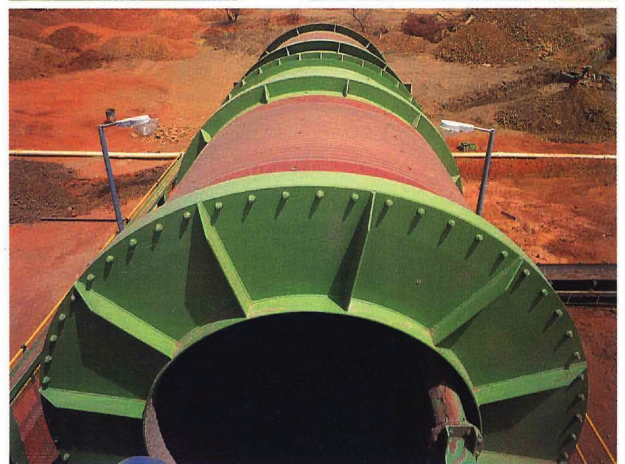
AGGLOMERATION HANDLING

MAED erected an overland conveyor 889m long, which transports the agglomerated ore to an extendable conveyor 183m long. The extendable conveyor then discharges onto 26 individual grasshopper conveyors each 35m long.

Total conveying distance from the agglomeration drum to the heap is approximately 1.9kms.

STACKING

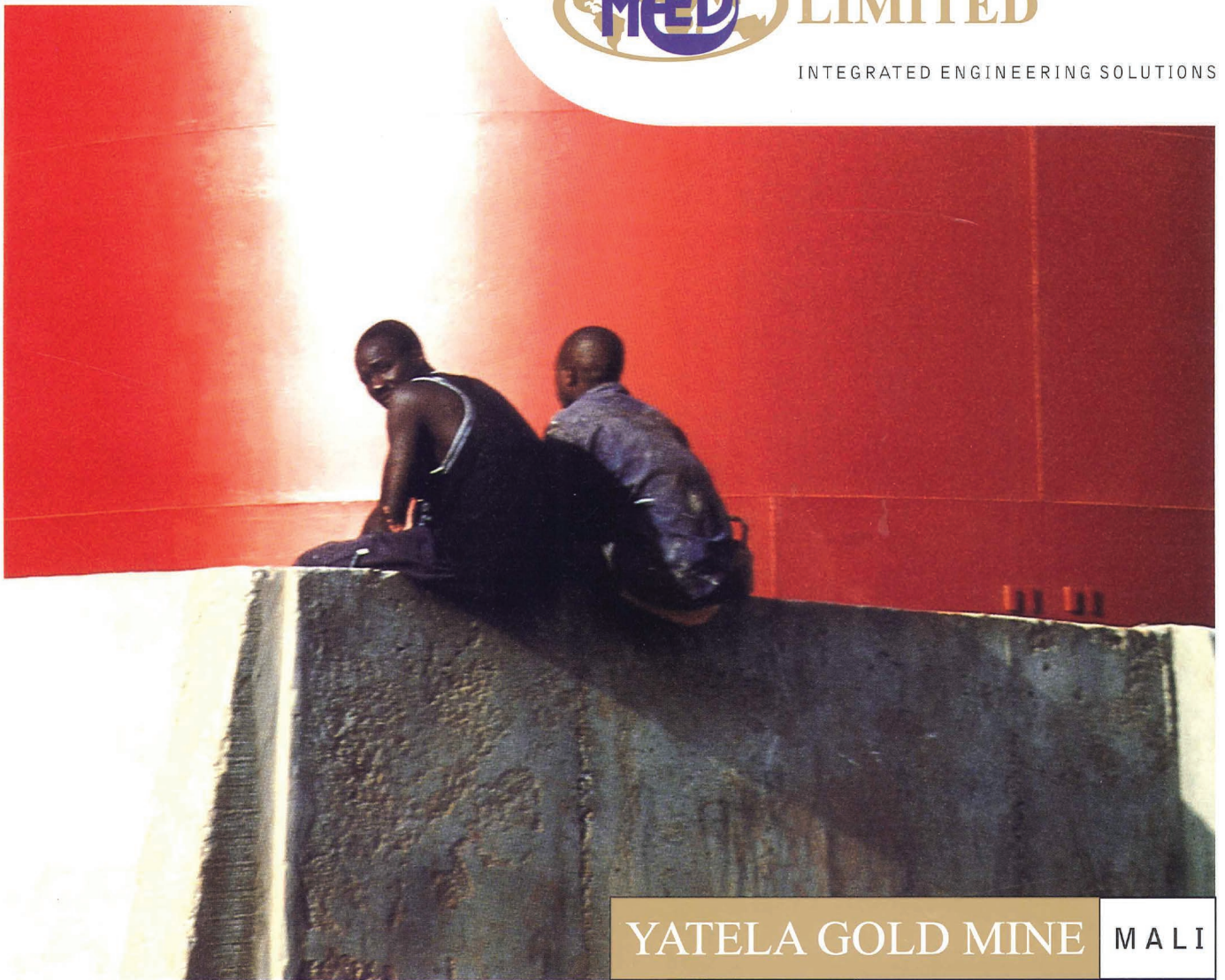
MAED erected a 38m stacker feed and 32m stacker conveyor complete with 5m stinger. The stacker conveyor slews on hydraulically jacked slewing wheels, which are hydraulically driven. The stinger conveyor extends and retracts 5m beyond the stacker head by means of a hydraulic cylinder.





MAED LIMITED

INTEGRATED ENGINEERING SOLUTIONS



YATELA GOLD MINE MALI

INFRASTRUCTURE

INFRASTRUCTURE

MAED was contracted to supply the total infrastructure essential to support the Yatela gold mining operation.

HOUSING

To accommodate personnel from senior to junior levels, MAED constructed 5 two-bedroom houses for senior personnel, 30 single-living houses and 47 four bedroom communal houses. Wall-mounted air-conditioning units were installed in the houses for added comfort.

Within the staff village MAED also constructed a Recreation Club comprising a dining area, pub, kitchen, two bathrooms, stores, offices and a 160m³ swimming pool.

Various roads into, and within, the village were constructed, as well as the main access road to the plant, which covers a distance of 4.2km and is intersected by drainage culverts.



MAED was responsible for installing the civil engineering requirements for the village and the plant such as storm water drains, a septic tank and domestic and industrial waste disposal facilities.

Electrical power for the village is supplied by six generators, which are housed in a 576m² power generation facility.

ADMINISTRATION BLOCK

The 607m² administration block includes 410m² of air-conditioned office space, a reception area, kitchen, bathrooms and a strong-room.

CHANGE HOUSE AND LABORATORY

A comprehensive air-conditioned change house was constructed to cater for the needs of 60 staff members and comprises a shower and bath area, laundry and store room.

The 408m² laboratory section includes four work areas, a kitchen, two offices, two store rooms and two toilets.

PLANT BUILDINGS

STORAGE FACILITIES

MAED was contracted to construct several stores according to clients' plans and requirements. These included an 892m² steel structure Reagent Store and a 360m² Main Store.

The cement store, measuring approximately 2100m², was constructed with a cement transfer system and two 2t electric overhead travelling cranes. Approximately 943m³ of concrete and 371 tons of steel were transported to the site to construct the store.

LIGHT VEHICLE (LV) WORKSHOP

The remote setting of, and rough terrain surrounding, the Yatela site necessitated the construction of a LV Workshop for on-site repairs and maintenance. MAED erected a 437m² workshop with storerooms and offices.

Various other facilities were constructed at the Yatela site, including two messes, a gatehouse, an 80m³/hour water purification plant, an industrial waste disposal plant, a sewerage treatment plant and a 3250m³ raw water dam.



YATELA GOLD MINE MALI



INFRASTRUCTURE

