



# Resources Metal & Mining

Tata Consulting Engineers Ltd (TCE) established the Resources - Metal & Mining (SMM) business unit in the year 2005, catering to the industry's increasing requirement in the ferrous and non-ferrous metals segment. TCE is among the leading players in this industry segment providing one stop solutions for its valued customers from mines to metal manufacturing and processing. TCE's vast experience in the mining sector serves as a closed-loop solutions outfit, including metals processing, ancillary infrastructure and raw material management, right from exploration planning. TCE has proved its mettle in bringing world-class solutions across the steel, metals and mining industry. The wide array of sector specific services combined with international marquee clients, that TCE has served makes the M&M business unit a niche player in the industry.



# Key Sectors

<b>Mining</b>	Mining, geology & beneficiation solutions for Coal, Iron, Zinc, Copper, Bauxite, Gold & Diamond
<b>Non-Ferrous Metals</b>	Aluminium, Zinc, Copper & rare earth Metals
<b>Iron &amp; Steel</b>	Coke sinter iron making, Steel & Ferro Alloys, rolling & finishing mill

## Key Differentiators

Tata Consulting Engineers Ltd differentiates itself from engineering procurement contractors as a pure play engineering consultancy service provider with respect to Steel, Metal & Mining services. Our offerings are both Capex (services based on the capital expenditure of clients) and Opex (services pertaining to Operational expenses of clients).

CAPEX	OPEX	DEDICATED ENGINEERING CENTRE
<ul style="list-style-type: none"> <li>Basic engineering</li> </ul>	<ul style="list-style-type: none"> <li>Plant asset engineering documentation</li> </ul>	<ul style="list-style-type: none"> <li>TCE offers long-term engineering support by serving as an extended arm to alliance partners</li> </ul>
<ul style="list-style-type: none"> <li>Detail engineering</li> </ul>	<ul style="list-style-type: none"> <li>Asset health assessment</li> </ul>	
<ul style="list-style-type: none"> <li>End-to-end EPC &amp; project management</li> </ul>	<ul style="list-style-type: none"> <li>Environment compliance &amp; sustainability</li> </ul>	
<ul style="list-style-type: none"> <li>Complete portfolio management</li> </ul>	<ul style="list-style-type: none"> <li>Plant improvement &amp; debottlenecking</li> </ul>	
	<ul style="list-style-type: none"> <li>Plant digitisation &amp; simulation</li> </ul>	<ul style="list-style-type: none"> <li>This helps customers avail engineering services from dedicated facilities with dedicated personnel working in alignment to client ecosystems</li> </ul>
	<ul style="list-style-type: none"> <li>Industrial Internet of Things &amp; engineering data analytics</li> </ul>	





## Quick Facts

Enabled **10 Million**  
Ton integrated  
steel plant

**100+ Million**  
Ton of  
ore handling

**150+ Million**  
Ton of waste  
handling

**1 Million** m<sub>3</sub> of  
concrete for metal/  
mine infrastructure

**100,000 Ton**  
of equipment  
erection

**300,000 Ton**  
of structural  
steel engineering  
and fabrication

**1,900 MW** of power  
for metal/mine  
facilities

**80 MGD**  
of water provision  
for plant

**85 projects**  
across the globe  
on metal/mine





## Services

### Mining

- TCE provides Pit to Port engineering and project management services to its esteemed clientele. Mining segment's generic services cover mine utilities – concept, sourcing & design, planning of mine layout, infrastructure, auxiliary service facilities, water management, capital & operating cost, financial analysis. Other specialised services include –

#### Open cast mining:

Pit optimisation and scheduling, determination of pit geometry, ultimate pit slope, dump slope & slope stability analysis, life of mine plan, bench plans, dump plans, selection of mining technology and equipment selection, haul road design, drill – blast design

#### Underground mining:

Selection of mining method, design and location of shaft/incline, underground panel layout and design, equipment selection, drill – blast design, ventilation design and underground mine transport, support design, subsidence prediction



### Geology

- Exploration (all technical support), 3d modelling, resource estimation, geotechnical analysis, hydrogeological analysis, GR preparation, mine development strategy, etc.

### Mineral Beneficiation

- Technical support for sampling and lab analysis, simulation, scale up & flow sheet





development, mass & water balance, process control engineering, P&ID, equipment sizing & selection, layout engineering, CAPEX & OPEX, process audit & performance optimisation studies

### Material Handling

- Crushing & screening, storage yards, conveying systems, unloading, stacking, storage & reclaiming system, proportioning, blending & recycling, truck loading systems, rapid load out system, ship loading & unloading systems

### Mine Infrastructure

- Planning of overall layout, engineering of plant & non-plant buildings & architectural designs, roads, hydrology & hydrological studies, water sourcing engineering, power sourcing & reticulation

### Steel & Metals

#### Ferrous

Raw material handling, iron making (blast furnace, sinter/pellet/DRI making, coke oven & by-product plant, lime calcining), steel making & ferro-alloys plant, rolling mills – flats & long, coating & finishing

#### Non-ferrous

- Raw material handling, alumina refinery smelting, rolling/fabrication, zinc processing
- Shared services and utilities for Steel Metals & Mining
- Modernisation solutions through plant asset digitisation for upgrades and modernisation



# Case Study

## Mining & beneficiation solutions for zinc mine in South Africa

The world's largest and developed zinc deposit site was discovered over 30 years ago but remained unexcavated due to its viability. TCE's SMM business unit provided detailed feasibility studies and provided solutions to turn around the mine with a three-pronged solution.

1) The prime challenge was the complexity of the terrain. The ore itself was positioned at a depth of 200 metres the two-year capex expenditure for excavation to get to the ore made the project unviable.

**Solution:** M&M applied mine planning software and geomodelling systems to determine the mining techniques relevant to the terrain. This helped to get to the ore in a cost-effective manner.

2) The rich deposit of zinc, concentrated as it were, was low grade zinc and high in manganese content.

**Solution:** TCE provided solutions to apply mineral beneficiation techniques and



operation strategies to extract high zinc concentrate and separate the manganese concentrate. This made the zinc ore a profitable product.

3) Regulatory standards imposed a penalty for manganese dump which affected the margins severely.



**Solution:**

A combination of material handling and technology innovations for recycling waste effectively helped to manage the manganese dump

**What TCE did differently?**

- Collaborating and partnering with global experts/consultancy firms and institutes
  - Alignment of campaign process with marketability
  - Additional marketable product (Lead) other than prime metal (Zinc)
  - Mine option study and beneficiation simulation to suit the demand
  - Mine closure plans for the mine pit area, plant area
  - Introduction of impermeable membrane in the tailing storage area to prevent ground water contamination
  - Engineered layout to protect bio-diversity hotspots
  - Relocation and rehabilitation of flora and fauna unique to Gamsberg
  - Introduction of global procurement covering SEA, China and India
- In effect, the M&M business recommended a mine planning strategy to reduce capex cost in excavation, mineral beneficiation strategies to comply with regulatory standards and ensure margins on the end product and technology innovations for recycling waste effectively.



# Key Achievements

Project details	Value additions delivered
Feasibility study for establishment of iron ore mining & steel production facilities in Ethiopia	Complex nature of the ore due to low grade Goethite Fe & high content of Alumina & Silica were managed through beneficiation solutions and production facilities planned
Pre-feasibility studies and plan for a large diamond mining project for an MNC	Water resource management (by way of reduction of specific consumption of water and by extensive rainwater harvesting arrangements) solutions that led to cost savings through reduction in reservoir capacity, reduction in number of dykes for PLSF, reduction in capacity of crushed ore stockpile & compact layout with minimal cutting and filling
Engineering consultancy for a blast furnace, the largest in the country (2013)	Turnkey execution of the project completed in record time and in line with international standards. Innovative engineering solutions such as design and engineering of 4-poster structure thereby eliminating the need for pouring concrete into the hollow structures, engineered sequence of installation of the down comer connecting blast furnace and gas cleaning plant were premium solutions to the client
55,000 TPA High Carbon Ferrochrome Plant	The water requirement of 220 CMH was addressed by the water collected in reservoirs during monsoon. Cost-effective water solution was provided through water from Karatali Reservoir (KR) of the State Irrigation Department, construction of anicut rain water harvesting, ground water, sea water desalination
The green field zinc mine project consists of open cast mine, ore beneficiation plant and associated infrastructure in South Africa	Solutions provided resulted in savings of around 100 million USD (which is around 25% of the capex). After process optimisation benefits included – number of flotation cells reduced, total effective volume reduced thus reducing the requirement of air in turn reducing the capacity requirement of blower, overall footprint of plant reduced, overall power consumption reduced
Consultancy Engineering Services for MHS-RLS System for iron ore conveying	Merger of MCC building and optimisation of bin configuration thereby leading to cost reduction to the tune of ₹10 crore to client

## Contact

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