



Project Management Consultancy

Tata Consulting Engineers Ltd (TCE) offers totally integrated project management consultancy services through the Project Management Consultancy (PMC) Business Unit (BU). 'Totally integrated' takes an all new meaning for TCE's PMC BU. We look at project management and construction management solutions in totality, integrating with engineering and procurement skills. PMC is a disruptive offering from TCE providing the much needed transparency, ethics and values bundled with structure and professionalism, the market requires.

We have the expertise ranging from architectural engineering, basic engineering, detailed engineering, project management and construction management. We take our holistic solutions a step further by extending our services through the entire asset life-cycle by offering opex services management. From the simplest of projects to the most complex such as large nuclear energy facilities, we have proved our might as the country's top notch PMC service providers. These diverse capabilities are endorsed with high ethical practices and international standards in safety and quality. We have built this strong reputation through our hard work over the decades and this brings our customers back to us repeatedly.



Key Sectors

Project Management

Pre project activities, Procurement management, Tender preparation, Tender evaluation and recommendation

Construction Management

Construction management, supervision and commissioning support, schedule management, quality management, safety management, safety audits and quality audits

Opex Services

Outage management, construction simulation (4D-5D), drone survey, brownfield upgrades and modernisation



Quick Facts

USD 7 bn
worth of projects
currently being
managed

PMC for
Indonesia's largest
cement plant at
USD 1.3 bn capex

End-to-end
consultants for
Africa's largest
fertiliser plant

PMC support
services for
6 x 800 mw
supercritical
power plant in
South Africa

Complex urban
development projects
for the states of
Gujarat, Madhya
Pradesh, Andhra
Pradesh, etc.

PMC services
for an extremely
complex zinc
mining facility
in Africa

TCE Advantage

TCE's PMC BU is among the country's leading service providers with expertise garnered over 5 decades in the engineering consulting business. The PMC BU provides customers exclusive value propositions which makes TCE's PMC, one of its kind.

Key Differentiators

- TCE has the most diverse and specialist talent covering all engineering streams under one roof. It is among the few companies in the country that employs the largest number of specialist talent.
- TCE has several decades of expertise in handling complex projects, involving stakeholders from different geographies, at various stages of the project life cycle.
- Availability of cross-functional services such as design engineering, master plan, architectural engineering, front end design, detail engineering, etc., strengthens the PMC value propositions as TCE is able to provide end-to-end solutions. Customers benefit from the unique value engineering solutions that TCE packages with the PMC solutions.
- TCE's PMC BU has invested heavily in state-of-the-art engineering suites to provide 3D, 4D & 5D solutions. Through simulations and walkthroughs, TCE's PMC services becomes a completely predictive business with key constructability issues addressed before commencement of construction.
- The construction simulation using 5D platforms creates a digital double of the entire project. Construction clash detection, construction planning for optimal cost efficiency, prevention of conflicts during construction, safety management, etc., are some of the unique benefits that the PMC BU provides its clients.
- Entire construction planning process is done from drawing stage where cost impact is minimal making the construction and commissioning process highly cost effective. Deployment of resources, machinery, etc., are done at the right stage without any idling of expensive resources.
- PMC BU's vast expertise and domain knowledge helps in providing value engineering solutions at every stage of construction management, bringing huge savings in project costing.





- TCE also provides brownfield upgrades and modernisation such that there is minimum downtime of the production facilities. TCE has provided valuable solutions in several steel, chemical and energy plant modernisation with very minimal downtime.
- Vast expertise and resources: TCE, at any given time has about 122-150 projects running with in-house personnel deployed at sites across the globe.
- The PMC BU has managed about 278 million man hours in PMC. The BU ensures utmost safety in all the projects it manages right from design stage.
- TCE observes international codes and standards and it is known for its safety standards and quality systems. With thorough processes and documentation, ethical management of billing and payments, TCE assures the Tata stamp of ethics and integrity in all projects undertaken. It has worked with several projects funded by international funding agencies such as World Bank, Japan International Cooperation Agency (JICA), ADB, etc., where it was selected solely on its technical merits.



Case Study

World's largest dry-cooled power station in South Africa (capacity 6 x 800 MW)

TCE's PMC BU

TCE has been assigned by ESKOM to provide Field & Quality Management Services at Medupi power station project in South Africa to overcome the boiler technical challenges related to quality issues which hampered the entire project progress. Medupi is a green field coal fired power plant comprising of six units with a gross nominal capacity of 800 MW each, resulting in a total capacity of 4,800 MW. The power station will be the fourth largest coal plant in the southern hemisphere and will be the biggest dry-cooled power station in the world. TCE was consulted for quality interventions to ensure compliance as defined.

Challenges

- Communication gap between client and contractors in the field of construction, project management and engineering document review process.
- Huge backlogs on engineering documents review and open NCRs/NODs.
- While implementing a complex construction plan, TCE teams also faced

the challenge of lack of local expertise and talent, power outage, labour unrest and capital flow issues.

- After 7 years, construction of only one single unit was commissioned.

Our approach

- We have been able to develop better working relations, effective communication channels and good trust on each other with the contractor representatives, especially in Boiler package. By working as one team we were able to solve very long pending project issues.
- With an integrated approach of using technology insights, providing environmental solutions, making use of project management expertise, the BU could commission three units within a short turnaround time.
- Three units have been successfully commissioned and three more to go.
- Unit-6 was synchronised on March 2015, Unit-5 on September 2016 and Unit-4 on May 2017 respectively.



- We simplified the engineering document review process which saved time and drastically reduced the back logs. This simplified process helps to achieve the project milestone dates and reduce the project cost.
- As per our experience and advice, contractors have categorised the NCR/NOD & data book comments gave good results for achieving the milestones. This has also helped the closure of NCRs and reduced backlogs.
- We have improved the quality as well as reduced the data books review time, only because of our engineer's minute observation skills and good technical knowledge.

Value creation for the community

The project will add 12% to the client's power generation capacity, which can power Johannesburg and Pretoria at peak. The company is on a positive trajectory with its energy availability at 77.3% and operational surplus capacity of 5,600 MW. TCE's timely execution helped bring the project right on track to meet deliverables. Eskom estimated the effect on town of Lephalale's GDP would be 95% per year as

a result of constructions, while creating jobs to about 18,000 construction employees and 58% of the project spend would be local.

Medupi project has contributed to the improvement of local skills. Further, South African companies were prioritised for procurement and obtained 62% of the R75 billion of the contracts.

Other added benefits of the Medupi project included skills development as well as the investing in excess of R2.3 billion in infrastructure as well as socio-economic development initiatives in Lephalale.

With the commissioning of the project, the availability of power and easing of load shedding in the region is expected to bring an increase of about 0.35% to South Africa's GDP.

The project received a special recognition for helping with refurbishment and building educational infrastructure in the Lephalale area. The project site was built on the principles of zero tolerance to harm.

Sustainable initiatives

Developed as a zero-liquid effluent discharge station that continuously monitors emissions, all the cooling towers utilise direct cooling technology which uses air-cooling condensers. Improved environmental performance via lower water usage, air bag filters, low NO₂ burners and supercritical boilers was achieved.

Value additions

Our best technical/quality practices helped to improve the project time lines by avoiding repeat works. Project provides direct employment to almost 18,000 persons and also generates more indirect employment and entrepreneurial opportunities in the region. TCE's association in the project helped develop local talent and knowledge transfer for similar projects in the future.

Case Study

Kusile Power Station

Kusile Power Station (formerly known as the Bravo Power Station) in South Africa is a coal-fired power plant under construction by state electricity utility Eskom.

It is expected that Kusile would consist of six 800 MW coal-fired generating units for a total generating capacity of 4,800 MWs. Once completed, Kusile will be the fourth-largest coal-fired power station in the world.

Initially expected to take 6 years to complete, now the project is expected to complete before 2020.

The power station will be the first in South Africa and also on the African continent to use Wet Flue-Gas Desulphurisation (WFGD) technology. WFGD is the current state-of-the-art technology that is used to remove oxides of sulphur (SOX), for example, sulphur dioxide (SO₂), from the exhaust flue gas in power plants that burn fossil fuels such as coal or gas. Eskom is fitting WFGD at the Kusile plant as an atmospheric emission abatement technology,

in line with current international practice, so as to ensure compliance with air quality standards. Total site area is 1355 hectares (3348 acres). 155 billion Rands. Total cost to completion (CTC) for Kusile power station will be 225 billion Rands.

TCE's PMC BU provided the construction supervision and quality management, project management and final engineering data books certification and management services for Kusile power project in South Africa to overcome the boiler quality issues which affected the overall project performance and to overcome the project delay. TCE was consulted for quality interventions to ensure compliance as defined.

Challenges

1. Communication gap between client and contractors in the field of construction, project management and engineering document review process.
2. Number of different departments was working for the same project activity and



they were generating different project reports and different outstanding job list which further increased project complexity.

3. Lack of local expertise and talent, power outage, labour unrest and capital flow issues.
4. After 7 years of construction not a single unit was commissioned.
5. Due to all the above issues the project was suffering huge delays, financial losses, technical challenges on site activities, huge backlogs on engineering documents review and open NCRs/NODs.

Our approach & value additions

1. Our best technical/quality practices helped to improve the project time lines by avoiding repeat works. It was TCE who started daily

morning and evening meetings at the construction site in presence of all the departments to sort out the problems without any delays instead of having those meetings at the project office.

2. Our TCE project management team have been able to establish new and effective project management structure as per the packages and produce one report covering engineering, construction and quality departments. TCE also produces overall one project report for the higher management. This new effective project management nullified all the project management related issues.

3. We have been able to develop better working relations, effective communication channels and good trust on each other with the contractor representatives, especially in key packages of Boiler, Turbine, Water Treatment BOP & FGD. By working as one team we were able to solve very long pending project issues.
4. We simplified the engineering document review process which saved time and drastically reduced the back logs. This simplified process helps to achieve the project milestone dates and reduced the project cost.
5. Our TCE experienced engineers are working with local engineers and helping them to increase their competency level and technical knowledge. TCE's association in the project helped develop local talent and knowledge transfer for similar projects in the future.
6. Construction knowledge and expertise of build in Mundra Project (in India) has helped in bridging knowledge gaps by the current execution partner in terms of logic and sequence of execution and more evidently pushing the works to be completed when there seemed no hope.
7. As per our experience and advice, contractors have categorised all the open NCRs as "Accept as it is", "Repair", "Rework", "Replace", "Testing" and "Related to project schedule". This has also helped the closure of NCRs and reduced backlogs. Categorising the NCR/NOD and data book comments gave good results for achieving the milestones.
8. TCE experienced engineers have established the engineering data books tracking management system for Boiler Unit 1 to 6 in Kusile for the first time. This engineering data books management

system also helps to update project schedule and overcome the site construction constants. We have improved the quality as well as reduced the data books review time, only because of our engineer's minute observation skills and good technical knowledge.

9. Proper manpower management in each department increases the proper utilisation of man hours and their efficiency which directly reduced the project cost.
10. After deployment of our TCE construction, project management, QA/QC and welding engineers Kusile witnessed the first time milestone achievement for boiler Unit 1 to 6. Kusile successfully achieved the Unit 1 chemical cleaning, first fire and commercial operation, Unit 2 hydro test, chemical cleaning, first fire and Unit 3 & 4 hydro test.

The project provides direct employment to almost 18,500 people and also generates 4,000 indirect employment and entrepreneurial opportunities in the region. With an integrated approach of using technology insights, providing environmental solutions are making use of project management expertise.



Value creation for the community

- With the commissioning of the project, there is availability of power and easing of load shedding in the region.
- Kusile will directly grow South Africa's GDP by approximately 0.35% per year (~R14 billion).
- Approximately 12,000 meals are provided weekly.
- A workforce of $\pm 13,000$ people is transported by bus to site.
- HIV screening and counselling, chronic disease management, primary health care and emergency services are provided.
- Accommodation is provided to over 5,000 employees.
- 10 black-youth-owned businesses, 263 million Rands invested.
- 171 black-woman-owned businesses, 3,009 billion Rands invested.
- 230 small black enterprises, 1,638 billion Rands invested.
- 345 other businesses, 1,975 billion Rands invested.
- 140 large black suppliers 2,322 billion Rands invested.
- 2,950 youths underwent engineering, technician, artisan and semi-skilled training programmes. Target of youth to be trained by the end of this project is 3,405.
- Continued up skilling of unskilled and semi-skilled workers to approximately 10,000 local workforces. Task team re-establishment to ensure skills transfer between expatriates and local workforce.
- Increasing universal access to electricity by connecting more than 2,00,000 households to the grid.
- Enabling growth in the region by supplying more electricity to South Africa and its neighbouring countries facing harsh drought conditions. South Africa's primary electricity supplier generates approximately 90% of the electricity used in South Africa, and approximately 40% of the electricity used on the African continent ensuring reliable electricity supply through improved generation asset performance.

TCE's timely execution helped bring the project right on track to meet deliverables. Project site was built on the principles of zero tolerance to harm.

Sustainable initiatives

- With the commissioning of the project, the availability of power and easing of load shedding in the region. Developed as a zero-liquid effluent discharge station that continuously monitors emissions, all the cooling towers utilise direct cooling technology which uses air cooling condensers.
- Improved environmental performance via lower water usage, air bag filters, FGD, low NO₂ burners and supercritical boilers was achieved.
- Overall goal for operation is to ensure that the operation and maintenance of the Kusile power station does not have unforeseen or avoidable impacts on the environment, and to ensure that all impacts are monitored and the necessary corrective action taken in all cases.

Client testimony

Since they (TCE) joined the Medupi Project, they have timeously supported all the major construction milestones, supporting the commercial operation of Medupi Unit 5 and synchronisation of Unit 4 and are continuing to deliver quality assurance work for the remaining Units 3, 2 and 1.

Mr. Jacky Mahtobela, Project Engineering Manager, Medupi Project, South Africa

It was a big challenge to complete the data books review within the limited time otherwise Unit 2 pressure test milestone would have to be shifted for another one month due to boiler Unit 1 first fire and steam blow activity which were more vital. In addition your team work provided excellent assistance in helping us to achieve a vital milestone within a very short time period. We appreciate all your hard work including non-stop 24 hours data books review work.

Within a very short period of time you and your team have cleared all the data books backlogs pending with Eskom for Unit 1 & 2 which is to our surprise.

Mr. Thulani Mtshali, South Africa

Contact

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