

COMPANY

TATA Consulting Engineers Limited

LOCATION

Mumbai, India

SOFTWARE

Autodesk® Navisworks®

Largest Single location greenfield Project.

TCE delivers state-of-the-art steel plant project.

“Project excellence is crucial to TCE. Some of our clients are happy using 2D and do not demand for the use of advance technologies. However, to achieve quality and full compliance with today’s international standards. We’ve adapted BIM to fulfill our commitment while fully satisfying our customers on every project,”

—Senior General Manager
Civil TCE

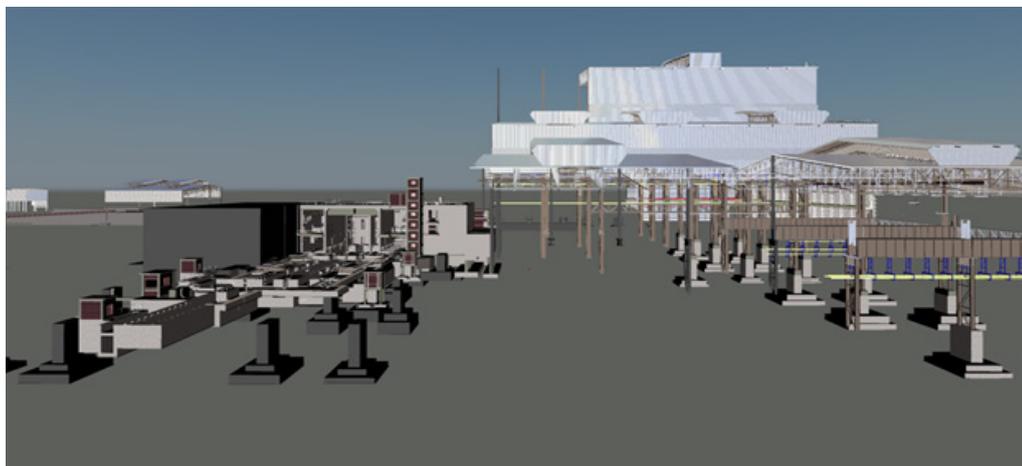


Image courtesy of TCE

TATA Consulting Engineers Limited (TCE) is an integrated engineering consultancy solutions provider that provides services from concept to commissioning. The company offers engineering services in key industry segments such as Power, Nuclear & Special Projects, Chemical, Infrastructure, Steel Metal & Mining. Dedicated service streams such as Advanced Technologies and Construction management address the unique needs of the key sectors.

TATA Consulting Engineers’ consultancy solutions include engineering consultancy services such as feasibility studies, pre-project reports and technical studies, design, engineering, detailed engineering, environment impact assessment, sustainability and green technology solutions; project management consultancy services include EPCM services, project management services, equipment management and commissioning support; construction management consultancy includes construction support and safety management services.

Established in 1962, the company is a wholly-owned subsidiary of TATA Sons Ltd. With headquarters in Mumbai, the company has domestic offices in Delhi-NCR region, Pune, Jamshedpur, Kolkata, Bangalore, Chennai and international offices in South Africa, Qatar & USA. TCE has delivered more than 7,150 successful projects to global clients and has established a good presence pan-India, Middle East, Africa & the USA.

The company has an international reputation for its work in key sectors including the infrastructure sector. This is accompanied by many notable design awards for its environment and sustainability contributions that reflect the company’s success in managing complexity and improving the quality of lives around the globe.

The Project

TCE is currently engaged for providing Engineering Consultancy Services to an integrated steel plant wherein Engineering activities are being carried out in 3D using BIM solutions.

The Challenges:

Developing such a mega project is in itself a formidable challenge. The project consist of the storage, raw material handling system, main steelmaking workshop and supporting facilities, a continuous casting workshop and supporting facilities, a boiler room, water treatment facilities, and other related facilities. As TCE was not involved in the phase one of the project it proved particularly challenging for the TCE team as it had to integrate both sections in order to keep smooth flow of steel production process.

A metallurgical project usually contains a lot of equipment, so design collaboration is frequent among such disciplines as raw material handling system, process control systems, water supply and drainage and its ventilation piping, plant layout, and separate internal product design. 3D design platforms eliminate error, makes iterations easy in complex projects and helps in collaboration saving effort and time.

Previously, the company's engineers took about a year to design large plants, but with the introduction of BIM to their processes, design time has been reduced by 50 percent.

The Solution:

The 3D building information model provided a reliable representation of the actual building, and therefore it was used for the owner and design supervisors to check the feasibility of the design rationale and to clarify construction planning. The model incorporated not only the construction geometry of the complex main structure but also the smaller pieces used for work in high places, such as conveyors and tracks. Model review and clash detection ensured safety during construction, and it was used for finalizing proper positions and shapes of all elements.

Temporary pieces and steel members holding equipment, such as the lighting and broadcasting systems utilized in subsidiary work were also included in the model. TCE was able to smoothly receive an approval for the final design in an early stage of the project by describing all the joints based on its detailed model. Multi-disciplinary integrated model review also made it easier to understand the geometry of the junction house and the procedure to construct the RCC foundation, erect structural steel, electrical junction boxes, piping, fire, service water lines for multistory building. Furthermore, the model was useful not only for sharing information between the project's participants but also to explain the project to the customer.

In general, drawings have been the main communication tool among fabricators, design supervisors and construction managers. However, TCE chose the building information model as an information sharing platform. The model played a major role in terms of boosting collaboration efficiently, visualizing the plan, engineering inspections, and construction planning. Upon finalization of the 3D models, 2D construction drawings were extracted from the 3D models.

Various information combined into one model offers the advantage of being able to spot potential problems more easily. Matters that cannot be checked on the engineering drawings can be found in the model. The model can be an indispensable tool to share and integrate information at every stage for high-quality construction of highly complex, large-scale projects. BIM, in this case, promoted a smooth project flow and allowed TCE to visualize the construction plans and to eliminate problems by simulation as well as to prevent conditions that could have caused extra work and work delays.

From the initial stage of the project, a regular meeting of the design team, the construction managers, and the fabricators are held at regular

intervals, and they reviewed the progress based on the model. If there were concerns, all of the participants could understand the concerns at the same level and then work together to resolve them using a procedure based on the model.

Using Autodesk Naviswork clash detection or checks for accessibility and easy operation can be performed even faster. For any plant, achieving a tidy, elegant design and orderly, ergonomic operating options are the top priority. This is largely influenced by the pipework routing and the location of fittings and instruments. Schematic drawings of the pipe routing designed using Autodesk Plant 3D has made an important stride forward.

Furthermore, TCE's designers are now exchanging digital files with customers, including for the coordination and demonstration of technical solutions. Replacing the traditional paper-based mode, 3D data sharing has added significantly value to TCE experts and its customers.

Results:

The project set ambitious objectives for the collaborative use of models and the quality of data. All structural designers use the same multi-user modeling environment in Autodesk BIM solution for data transfer between plant design and structural design, the team used file format generated to communicate steel and concrete geometry to the plant viewing models.

TCE points out that Autodesk BIM has made a game-changing difference in terms of innovation and speed at the project. Previously, the company's engineers took about a year to design large plants, but with the introduction of BIM to their processes, design time has been reduced by 50 percent. During the construction of this type of equipment, there are almost always numerous changes and some delays, but with the aid of Autodesk, TCE has been able to cut the time from design-through-construction in half. In notable part, this significant gain is the result of minimizing changes that occur late in the development process.

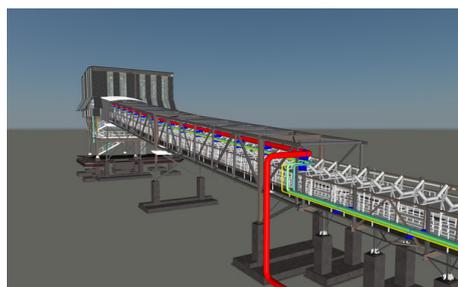


Image courtesy of TCE

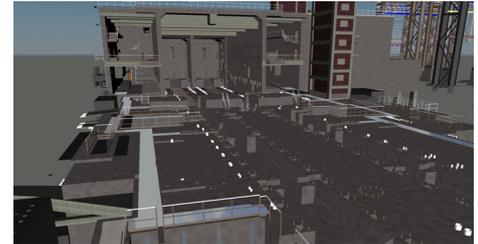


Image courtesy of TCE

"Autodesk BIM arranges complete project in a 3D model. The model was repeatedly used for simulation of clash detection, for example, it eliminates the need for corrections at the site and enables the complete project to be constructed without defects or problems,"

—Associate design engineer
TCE

"The 3D capabilities of Revit are perfectly attuned to TCE's strategic vision. Continuous improvement is a commitment we take very seriously in our company. Excellence is a standard that allows us to ensure and maintain our worldwide growth. Our process, our design, our validation checks, our reduced time-to-market, our constant search for innovation in every project... all these are assets enabled by Autodesk BIM that help our Group retain a competitive edge."

—Senior General Manager
Civil TCE