

Bridging the country together

Using Autodesk solutions, TPF Engineering Private Limited is building the country's infrastructure better

Introduction

TPF Engineering Private Limited (TPFEPL), part of the worldwide TPF Group, and formerly a part of S N Bhoje & Associates which was established in India in 1964, is one of the oldest civil engineering consulting firms in India and provides services in Bridge Design, Structural Engineering & Architecture and Planning. The company provides extensive consultancy services in the areas of civil infrastructure and transportation construction mainly comprising bridges, highways, and flyovers at various locations across India. The company has recently

added another feather cap to its portfolio with consulting for the construction of the 701-km Nagpur - Mumbai Super Communication Expressway (Maharashtra Samruddhi Mahamarg) in Maharashtra, that will bring Nagpur and Mumbai within 8 hours reach. The worldwide TPF group is ranked among the most important multidisciplinary companies active in the building, transport infrastructure, and the water and energy sectors, and is operational in 58 countries.

Catalysing Bridge Construction in India

When it comes to bridges, TPFEPL has provided consulting services for some of the most recent bridges in India, like the Cable-stayed bridge in Bhopal, Atal Setu and Gaundalim bridge in Goa, Times of India flyover, Ambedkar Road flyover, and Hindmata Chowk flyover in Mumbai, and the Kengeri Grade Separator in Bangalore to name a few.

For consulting on bridges, the company has traditionally

been using Autodesk tools, mainly working with AutoCAD, but with the advent of Revit from Autodesk, they are slowly moving towards the 3D tools. For example, TPFEPL has used Autodesk's Civil 3D for a long time for highways projects. They have now started incorporating these tools in consulting for construction of bridges too. InRoads from Autodesk has been a recent addition that fills in for visual modelling.

The challenge of Jabalpur Flyover-cum-ROB Project

The company recently embarked on a Flyover-cum-ROB project in the congested area of Jabalpur city. Jabalpur city is developed on both sides of the Railway Line and the existing ROB was the only bridge connecting both sides, leading to heavy traffic during peak hours. The existing carriageway was insufficient to cater to the current and estimated future traffic. In addition, the existing ROB's steepness caused inconvenience & safety issues for non-motor vehicles. The need was to widen the carriageway to a 4-lane one with footpaths of reduced width on either side for pedestrians. The main motive for TPFEP was to recommend a

feasible conceptual proposal for the project corridor to the client. The various site constraints like ensuring minimal disruption to existing facilities, proposing improvements within available right of way (ROW), showcasing the structural arrangement at both ROB and flyover were resolved using the Autodesk tools. Civil 3D was used in the preparation of plan and profile drawings for Flyover-cum-ROB in conformance to relevant IRC codes. Revit and Dynamo scripts were extensively used for Box Girder modelling for the ROB, while InRoads imported Civil 3D and Revit files and prepared a 3D model visualisation.

Riveting the design with Revit

TPFEPL used to create plans earlier in AutoCAD, where a lot of time was spent on replicating separate section views manually. With Revit now, this process is automated.

Earlier, the design team would use 2D models, and thus the actual visualisation would not be closer to the final output, but with Revit, the visualisation of the reinforcement details was closer to the actual reinforcement that would be placed. The 3D modelling also provided adequate support to the design engineers to check any conflicts with the reinforcement.

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With Revit, creating section views has now become instantaneous. Revit saves a lot of time for the team from what it originally used to take.

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The signage plan would initially take us 2-3 days for a 10-km stretch. But now with the Civil 3d Dynamo, we can automate it and reduce the work to almost a day. So that's a lot of time saving for us.

Gaining efficiency with Civil 3D

TPFEPL has been using Civil 3D for several years, but the gains have become manifold with the regular updates, especially with the arrival of Civil 3D Dynamo which automates the scripts to create a signage plan.



Integrating and visualisation with Infraworks

At TPFEPL, earlier, the design, the transportation and other teams used to work on different portions of the work separately. With the help of Infraworks visualization of a 3D model using Revit and Civil 3D files, the work of all the teams is now integrated with the entire structure being on the same model. The biggest benefit of Infraworks is perhaps the ability to provide an appealing and realistic virtual model of the final output to the client.

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The client needed to be able to visualize how will the new construction affect the existing structure. With the help of this 3D model, they were able to understand the number of junctions that will need to be developed, and if there will be any infringement on the existing road. The visibility of these kind of details helps them to better understand and then put it up to their superiors for approval.

Simplifying construction planning & modelling with Autodesk

With these updated Autodesk tools, TPFEPL has enhanced their productivity and the speed of execution & delivery than ever before.

In the Jabalpur flyover-cum-ROB project, TPFEPL has been able to effectively utilise all aspects of the Autodesk's Architecture, engineering, and Construction Collection especially the key tools like Civil 3D, Revit, and Infraworks to their optimum potential. For such a project in a densely populated city and with heavy traffic, the success achieved in showcasing the structural model with the use of these tools has been another feather in the cap for the company that always strives for building the world better.

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Even with a very recent exposure to the tools, the ease of their use reduced the team's effort significantly. With the time saved on repetitive drafting tasks, our time management has been much better.

