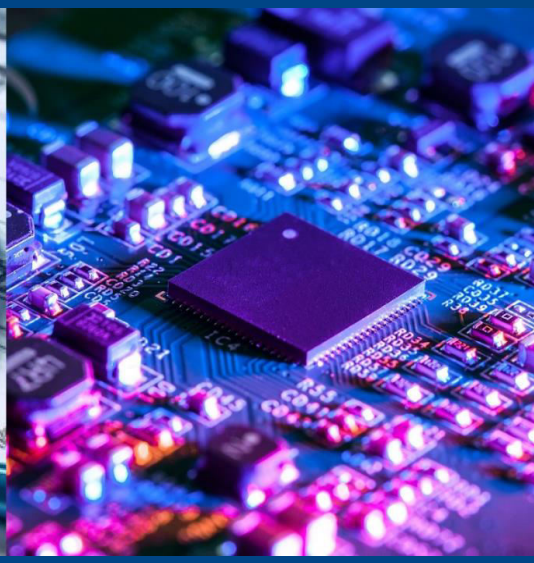
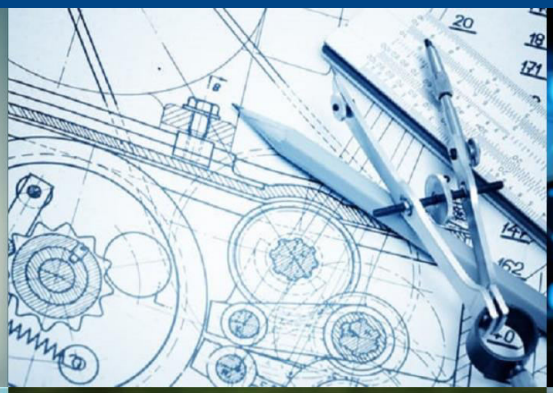
ISSN: 2582-7219

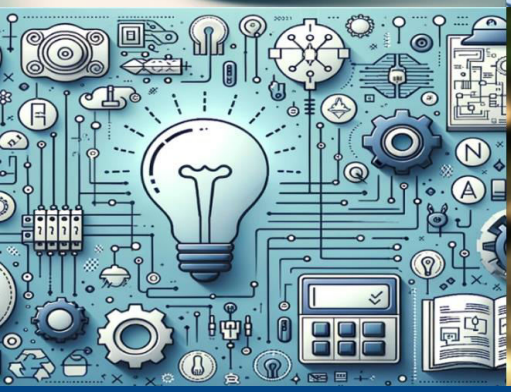




International Journal of Multidisciplinary Research in Science, Engineering and Technology

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.206 **Volume 8, Issue 6, June 2025**

© 2025 IJMRSET | Volume 8, Issue 6, June 2025| DOI:10.15680/IJMRSET.2025.0806147

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Design and Analysis of Bridge by using STAAD.Pro

J. Prakash, K. Madhu, M. Bharath Chandra, M. Harini Reddy

U.G. Student, Department of Civil Engineering, Guru Nanak Institutions Technical Campus, Ibrahimpatnam, Telangana, India

Assistant Professor, Department of Civil Engineering, Guru Nanak Institutions Technical Campus, Ibrahimpatnam, Telangana, India

ABSTRACT: This study delves into the application of STAAD.Pro in the design and analysis of different bridge types, focusing on aspects such as load distribution, structural behavior under dynamic conditions, and compliance with relevant design codes. By integrating STAAD.Pro's capabilities, engineers can perform comprehensive analyses that account for factors like live loads, seismic forces, and material properties. The findings underscore the software's efficacy in optimizing design parameters, enhancing structural integrity, and facilitating cost effective solutions.

KEYWORDS: Bridges, Steel-concrete composition bridges, Railway and highway bridges

I. INTRODUCTION

Bridges are critical components of transportation infrastructure, facilitating the movement of goods and people across challenging terrains such as rivers, valleys, and roadways. The design and analysis of these structures require meticulous planning, adherence to safety standards, and efficient utilization of materials. Traditionally, these tasks involved complex manual calculations and iterative design processes. However, advancements in computational tools have revolutionized this domain, enabling engineers to perform comprehensive analyses and optimize designs with greater accuracy and efficiency.

FEATURES OF STAADS.PRO

STAAD.Pro is increasingly incorporating AI and ML to automate and optimize structural analysis and design processes. For instance, Hyundai Engineering utilized STAAD.Pro in conjunction with AI algorithms to optimize geometry and framing configurations for mechanical shed structures, winning the 2023 Bentley Going Digital Award for Structural Engineering

II. LITERATUREREVIEW

Ramesh Kumar andAnkit Sharma (2016): worked on the structural design and analysis of a RCC T-beam bridge using STAAD Pro software. The study focused on calculating bending moments, shear forces, and deflections under various load combinations.

STAAD Pro provided accurate and efficient analysis results which helped in optimizing the cross-sectional dimensions of bridge elements while maintaining structural stability and safety standards.

Priya Verma and Rohit Mehta (2018):
carried out design and analysis of a box girder bridge using STAAD Pro. The paper emphasized on the advantages of STAAD Pro in handling complex bridge geometries and multiple loading scenarios. According to them, STAAD Pro assists in automated load application and structural verification, ensuring reliability in bridge design.

S. Karthik and G. Divya (2019):
worked on modeling and structural assessment of a steel truss bridge. The authors utilized STAAD Pro for simulation under various dynamic and static loads including vehicular, wind, and seismic forces. Their project highlighted the

importance of load combinations and boundary conditions in achieving realistic performance evaluation of the bridge structure.

Rahul Yadav and Neha Singh (2020):
focused on comparison of manual and software-based bridge design, where STAAD Pro was used for RCC slab bridge design. The results showed that STAAD Pro not only reduced the design time but also minimized human errors. The study concluded that STAAD Pro is an efficient tool for both analysis and detailing of bridge components.

Manish Patel and Deepika Sahu (2021):
conducted a project on the design of a cable-stayed bridge using STAAD Pro. The study included analysis of cable forces, pylon behavior, and deck deflection under live and dead loads. The authors concluded that the STAAD Pro platform provides comprehensive support for analyzing long-span and complex bridge structures accurately.

OBJECTIVE
To design and analysis of bridge by using STAAD.PRO software

III. METHODOLOGY

To design and analyze a bridge using STAAD Pro, define the bridge's geometry and create a 3D model, assign material properties, define load cases (dead, live, wind, seismic), apply loads and boundary conditions, run structural analysis to determine member forces, stresses, and deflections, and verify design according to relevant codes (e.g., IRC, AASHTO) using STAAD Pro's design modules.

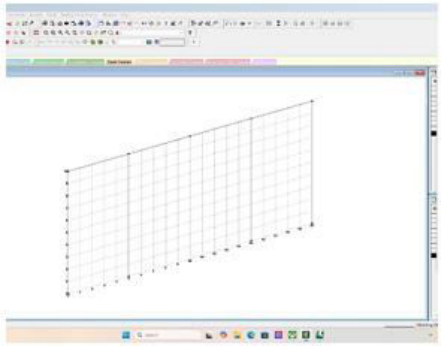


Figure 1 GEOMETRY

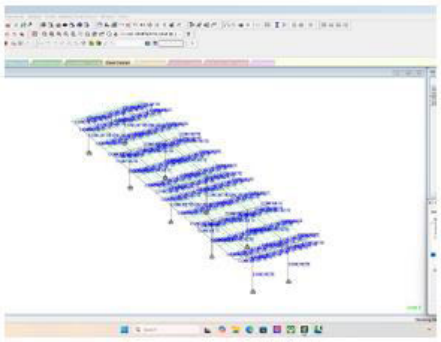


Figure 4: DISPLACEMENT

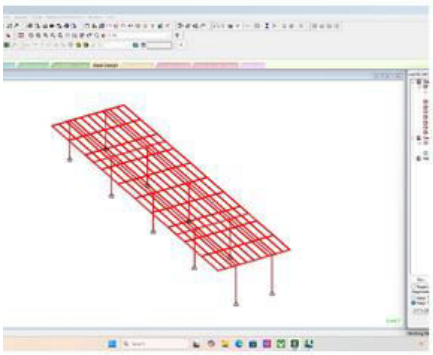


Figure 2 DEAD LOAD

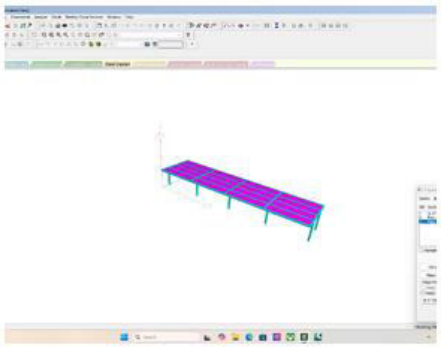


Figure 5: 3D diagram

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

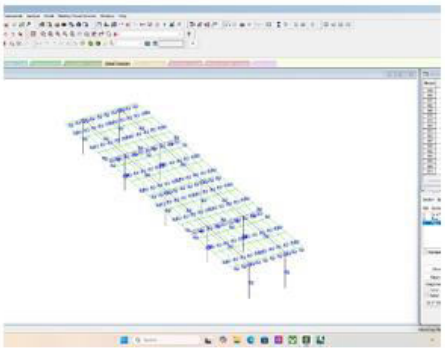


Figure 3 LIVE LOAD

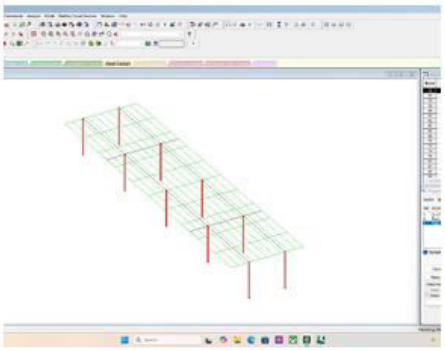


Figure 6: Material Assignment

IV. CONCLUSION

The design and analysis of bridges using STAAD Pro enables efficient and accurate structural evaluation, ensuring the bridge's safety, durability, and compliance with relevant design codes. By leveraging STAAD Pro's advanced analysis and design capabilities, engineers can optimize bridge design, reduce material costs, and improve construction efficiency.

STAAD Pro's powerful tools and features facilitate detailed modeling, load application, and analysis, allowing engineers to simulate various scenarios and predict bridge behavior under different conditions. This enables informed decision-making and ensures that the bridge design meets the required standards and specifications.

REFERENCES

1. Krishna Raju, N. (2006). 'Design of Bridges'. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Duggal, S.K. (2014). 'Design of Steel Structures'. McGraw Hill Education (India) Pvt Ltd.
3. STAAD.Pro V8i Documentation. Bentley Systems Inc. (2013). 'Analysis and Design of Structures using STAAD.Pro'
4. IRC:6-2017. 'Standard Specifications and Code of Practice for Road Bridges– Section II: Loads and Stresses'. Indian Roads Congress, New Delhi.
5. IS 456:2000. 'Plain and Reinforced Concrete– Code of Practice'. Bureau of Indian Standards, New Delhi.
6. Pundir, B.P. (2012). 'Bridge Engineering'. Laxmi Publications Pvt Ltd.
7. Rajput, R.K. (2009). 'Strength of Materials'. S. Chand Publishing.
8. Patil, S.S., & Desai, A.K. (2013). 'Analysis and Design of Bridge Superstructure using STAAD.Pro'. International Journal of Engineering Research and Applications, Vol. 3, Issue 4, pp. 179-183.
9. Gaurav, S., & Sharma, R. (2016). 'Design and Analysis of RCC T-beam Bridge using STAAD.Pro'. International Research Journal of Engineering and Technology (IRJET), Vol. 3, Issue 6.
10. Bentley Systems Inc. (2011). 'STAAD.Pro Technical Reference Manual'. i

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com