**G H Raisoni University, Amravati**

**Department of Civil Engineering**

**Comparing Truss Types For Railway Steel Bridges Under Dynamic Loads On Software**

**Introduction:**

In India, Economic progress mainly depends on the railway and is considered as the Life line of the Nation. India has the second largest rail network in the world, transporting over four billion people annually and the total figure of existing railway bridges are approx. 1, 20,000. Out of these, 731 are long span open girders, 19014 are rolled steel joist or plate girders. So, it can be seen that more than 20% are Steel girder bridges. Due to continuous movement trains, the members and their connections are subjected to repeated loadings due to which the stiffness of the joint gets reduced, which are more prone to fatigue damage. The conventional static, dynamic or stability analysis of Steel Trusses bridges assumes that their members are connected at rigid or hinged joints. However, in reality Steel Trusses are reinforced at their joints by Gusset plates, which possess rotational flexibility. The presence of this gusset plates has an appreciable effect on the stiffness of the members of the Bridge and consequently on its behavior to Static and Dynamic loading. However, the behavior of connections is neither rigid nor pinned. Structures having such flexible Joints in which Joint flexibility becomes important are called as semi rigid frame members. In fatigue assessment of the bridge components the joints are assumed to be rigid as per RDSO, where joint flexibility is neglected which may affect the dynamic behavior of the bridge component, consequently its fatigue life. Therefore, it is necessary to evaluate the bridge components for semi rigid connections.

**Keywords:** Steel Trusses, Dynamic loading, Bridge, etc,

**3**. **Sudhir Babu Patel, S.M.Asce (Aug 3, 2023)**

This study conducts a simulation-based fatigue life assessment for this railway bridge, considering full-scale train loading as per the Research Design and Standards Organization (RDSO) guidelines. The analysis utilizes STAAD.Pro CONNECT Edition software to assess critical members, calculate residual life, and evaluates the impact of 25T-2008 loading at varying speeds with stress bands of 5 and 10 MPa, employing a stress life–based approach. MATLAB software is employed to determine the number of repetitions based on the stress history diagram. The results highlight the importance of using a smaller stress band for accurate bridge life predictions. This study contributes valuable insights for the conditional health assessment of steel railway bridges, incorporating both an S-N curve-based approach and a fracture-based approach.

**Proposed Methodology:**

1. Aims and objective of the study.
2. Data collections
3. Classification of the material.
4. Type of material.
5. Functions
6. Type Load and its Distribution.
7. Data analysis
8. Results
9. Conclusion

**LiteratureReview:**

**Huihui Li, Anil Kumar Agrawal, Xi Chen3, Mohammed Attorney, and Hongfan Wang5 (May 30, 2022**)

This study presents an innovative and practical framework aimed at identifying critical members in steel truss bridges by incorporating the dynamic effects of sudden member loss through nonlinear dynamic analysis. The conventional numerical simulations for sudden member removal in truss bridges often demand substantial computational resources due to the modeling intricacies associated with truss members using shell or solid elements. In this proposed approach, the simulation integrates both yielding and buckling behavior of truss members, responding to the sudden removal of a member. This is achieved by employing the Hughes–Liu (H-L) beam formulation within the LS-DYNA software. The method demonstrates computational efficiency while maintaining the accuracy of numerical results. Validation of the modeling's reliability and accuracy is established through three examples of varying complexities. The effectiveness of the proposed approach in identifying critical members is exemplified through a case study of the Aby Bridge, originally designed as a fracture-critical bridge and serving as a simply supported truss bridge.

**Patricia Vanova, Zhen Sun, Odin-Eliott Odinson, Zhiyu Jiang (September2023)** **.**

Structural health monitoring is pivotal for ensuring the maintenance and longevity of bridges, especially under diverse loading conditions and potential damage scenarios. This study focuses on applying vibration-based methods to assess the structural health of a Warren-type truss bridge. The study considers various damage scenarios, involving crack locations and severities within a truss member. Furthermore, locations near the supports of the damaged member demonstrate more significant changes than other areas. This research contributes to a foundational comprehension of bridge dynamics and aids in the advancement of damage identification methods, thereby playing a crucial role in the overall understanding and maintenance of truss bridges.

**Future Scope:**

1. Continued research could help to further develop the relationships between redundancy and robustness in bridge design.
2. The scope of this thesis was limited to truss bridges of four different topologies. More truss topologies could be explored, as well as different bridge types.
3. The depths of the trusses could also be varied, to evaluate how redundancy and robustness vary with depth.
4. In this study short span is used for the testing for future large span is used for the research.
5. Hollow sections made up of Tube, hexagonal or circular are used for the improvement in the results by increase in the life of truss bridges.
6. For increase the properties of section use of concrete or other cheaper material fill in hollow section.
7. In this research static loading is taken for the further study dynamic loading can be taken.

using above data and important factors, a formula can be given for Indian construction Industry by modifying formula given by FIDIC silver book and clause 10CC.

**Conclusion:**

1. Shear Force: In terms of unbalance forces Pratt type truss bridge and Howe truss bridge is more stable showing less shear forces, whereas maximum is observed in K-Type truss bridge.
2. Axial Force: For the case of Axial force analysis, it is observed that out of the four Warren type truss bridge gives maximum values whereas owe has least value i.e. 1211.1 KN
3. Deflection: They observed that Maximum deflection is observed in Pratt truss bridge whereas least in K type truss bridge.
4. Steel Structure Weight: As India is a developing country therefore there is a need of economical sections to have a cost-effective design to bear same loading in lesser cost. In this study they observed that out of all four cases Howe type truss bridge shows least values which mean for the same loading it will take less weight of construction material which makes it more economical than others. i.e. 407.141 Newton.

**Limitation of study:**

* Due to immense variation in type of project, a lot more factors can be still found out by practical experience and by conducting more through literature review.
* Different software may also have variation in the results.

ed. Butterworths India, 2000.

**[2]** *GAJARIA, K, ed*. Law relating to building and engineering contracts in india*. 4th  ed. Butterworths India , 2000.*

**[1]** [*https://m.economicstimes.com/news/economy/infrastructure*](https://m.economicstimes.com/news/economy/infrastructure)*.*

**Name of Author: Shrikant S. Pendor**