Comparative Study on Single Web System Truss Tower With Portal System Truss Tower Using Finite Element Method By STAAD PRO Software

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Abstract - The transmission tower has a height of 43m. Literature survey revealed that comparative study of different types of Tower. Narrow based steel lattice transmission tower structure plays a vital role in its performance especially while considering eccentric loading conditions for high altitude as compared to other normal tower. Narrow based steel lattice transmission tower considered in this paper can safely withstand the design wind load and actually load acting on tower. As the aim of this study is to compare these two types of truss system used in transmission tower. It is determined that A type truss system is most suitable, stable and resistible whereas Portal System Truss Tower is second best Single web System Truss Tower is observed.

I. INTRODUCTION

A transmission tower or power tower (alternatively electricity pylon or variations) is a tall structure, usually a steel lattice tower, used to support an overhead power line.

II. OBJECTIVES

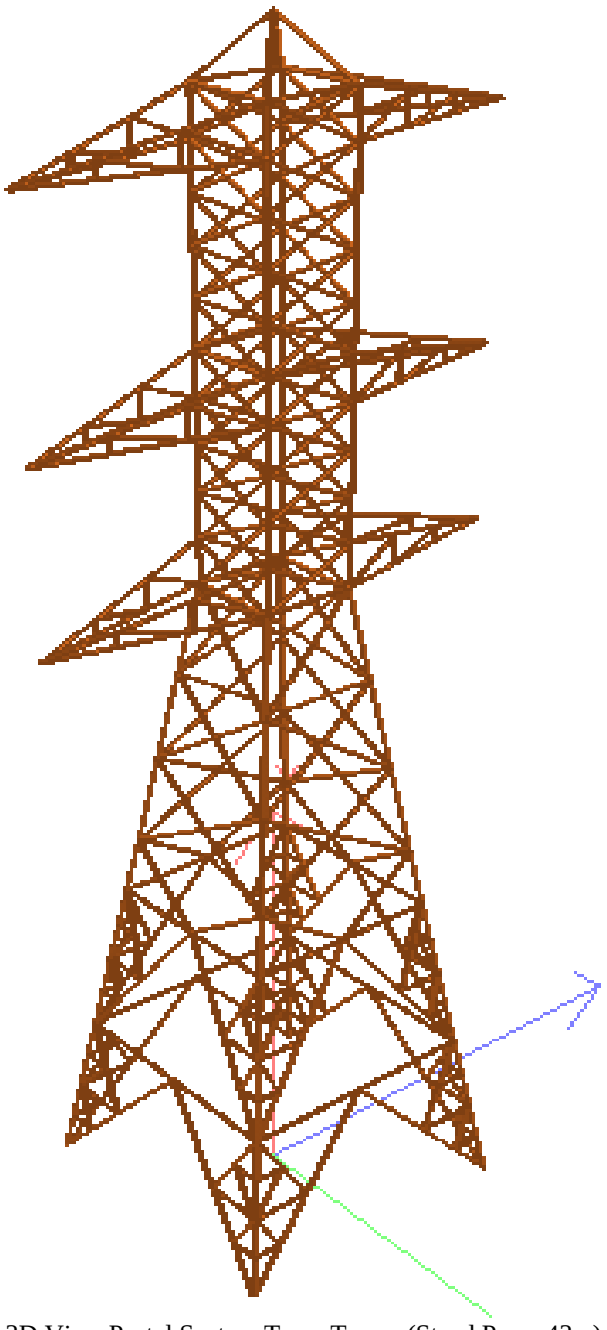
- Study of existing design of high tension tower.

III. METHODOLOGY

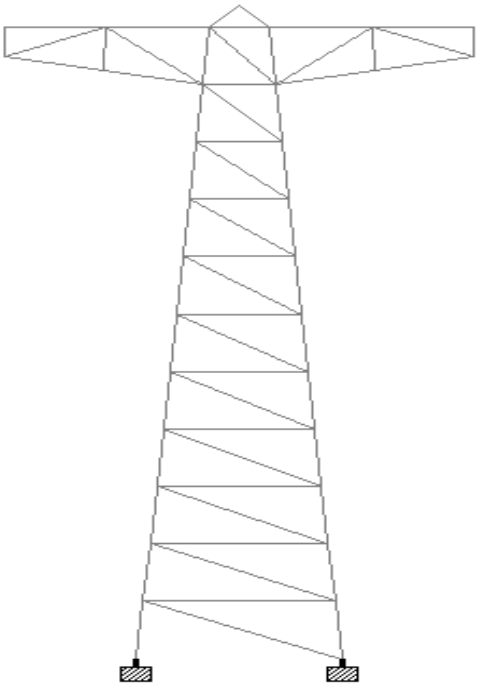
4.2.1 STAAD PRO

Following steps are required in a sequence for proper completion:

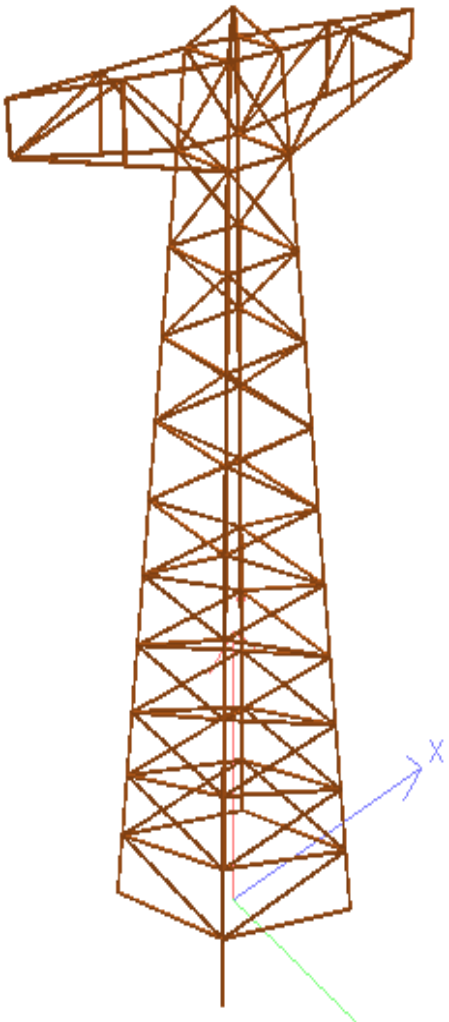
Step-1 Preparation of geometry of tower in STAAD PRO



3D View Portal System Truss Tower (Staad Pro – 43m)



Front View Single Web System Truss Tower (Staad Pro – 43m)



3D View Single Web System Truss Tower (Staad Pro – 43m)

Step-2 Assigning of support conditions.

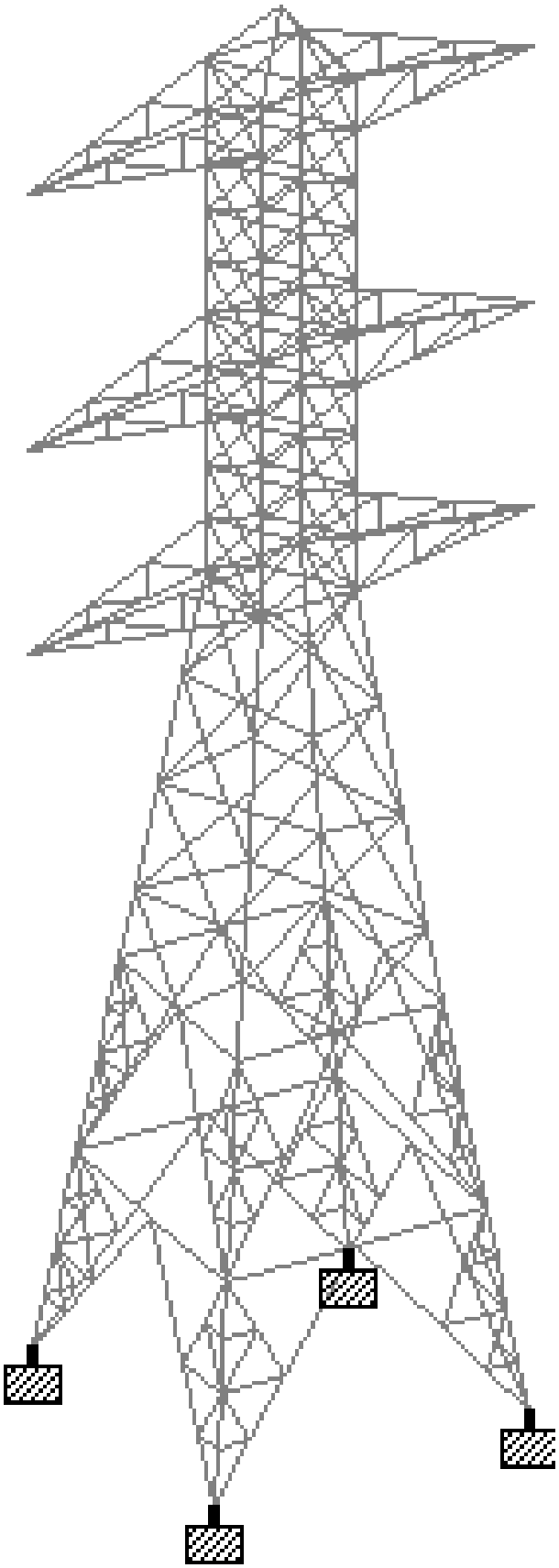


Fig. Support on Portal System Truss Tower (Staad Pro – 43m)

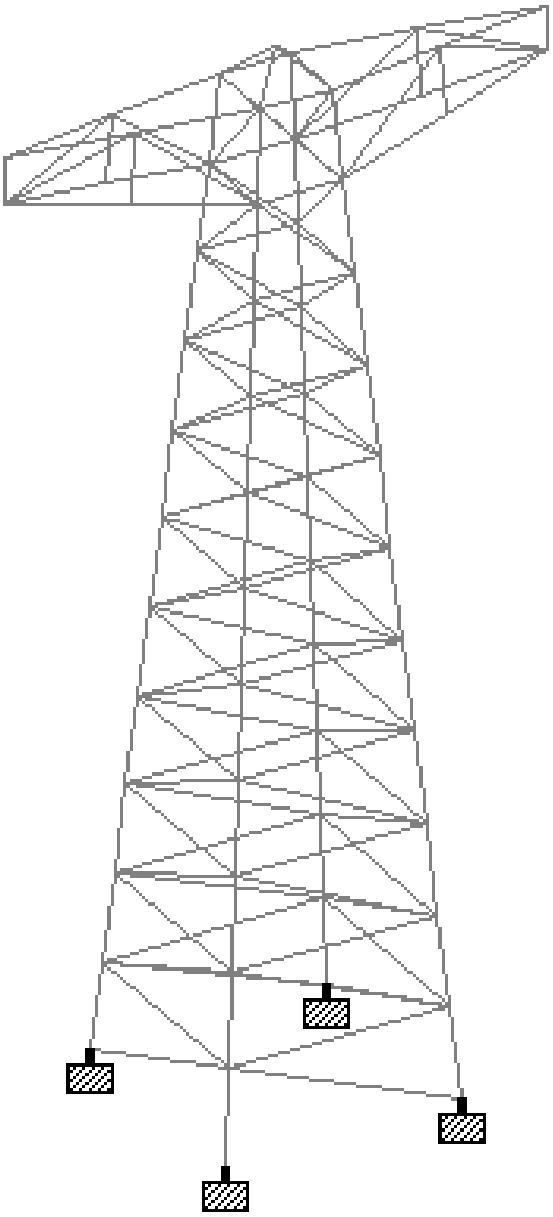


Fig. Support on Single Web System Truss Tower (Staad Pro – 43m)

Step-3 Assigning cable load as per specification.

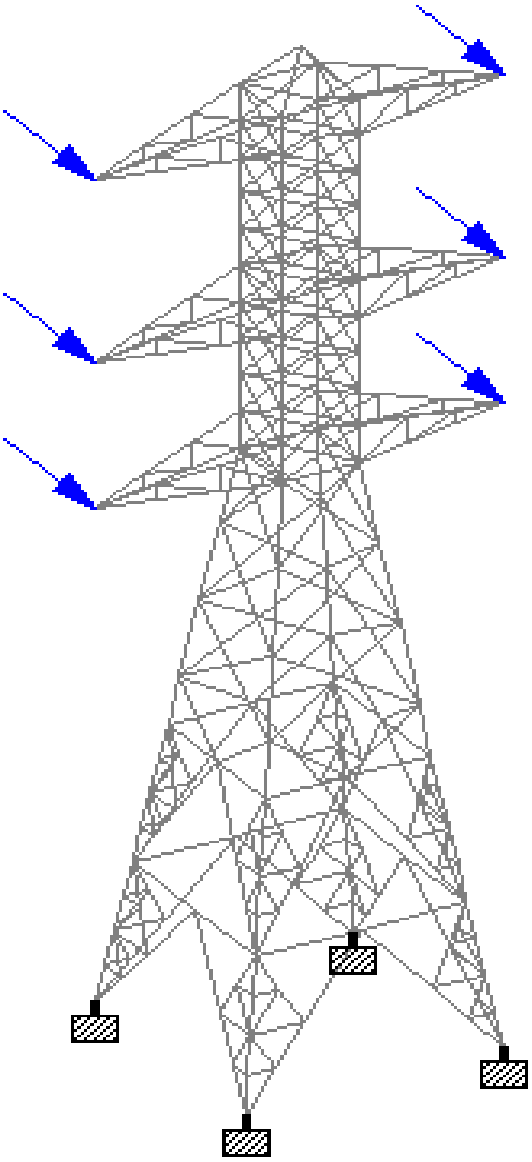


Fig. Load on Portal System Truss Tower (Staad Pro – 43m)

IV. RESULTS

5.4Staad Pro Max Forces & Moments Result

Fig. 5.6 Results for Tower Height 43 m for Seismic Zone II

Model	P	VX	VY	T	MX	MY
	kN	kN	kN	kNm	kNm	kNm
Portal System Truss Tower	17.19	0.00	149.69	0.02	235.22	0.00
Single Web System Truss Tower	0.19	4.00	2.04	6.13	1.92	5.12

5.5 Max Displacement Graphs

5.5.1 Graphs for Tower Height 43 m for Seismic Zone II

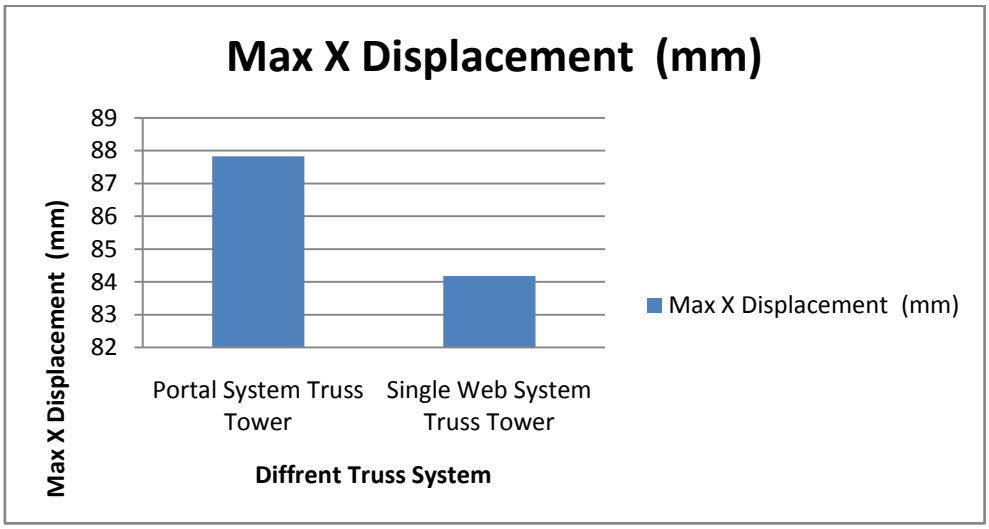


Fig. 1: Max. Displacement in X Direction

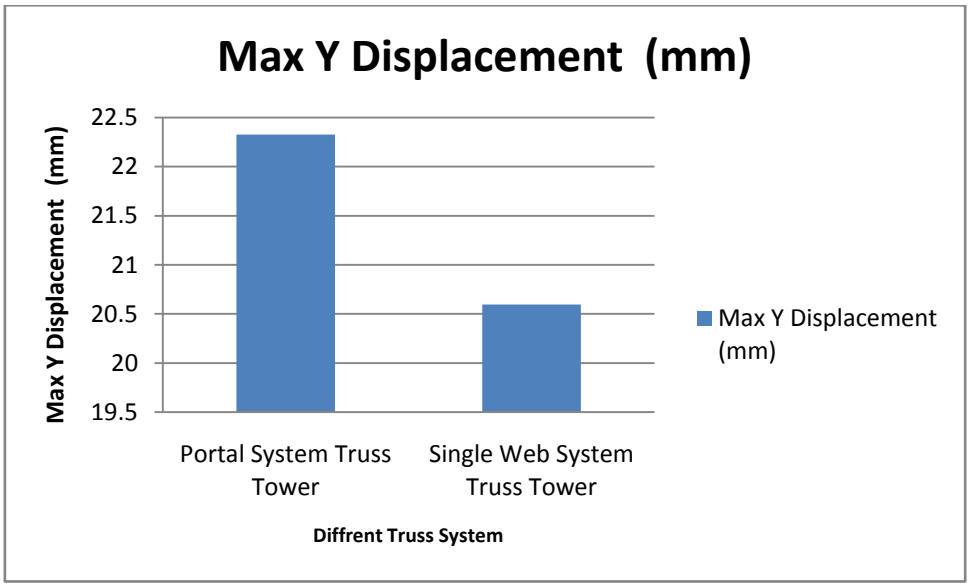


Fig. 2: Max. Displacement in Y Direction

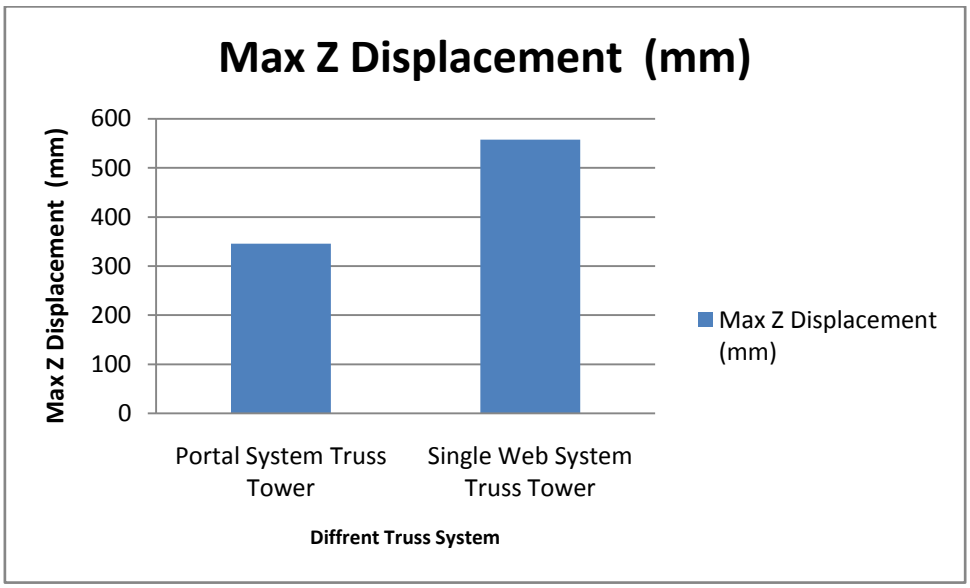


Fig. 3: Max. Displacement in Z Direction

5.6.1 Graphs for Tower Height 43 m for Seismic Zone II

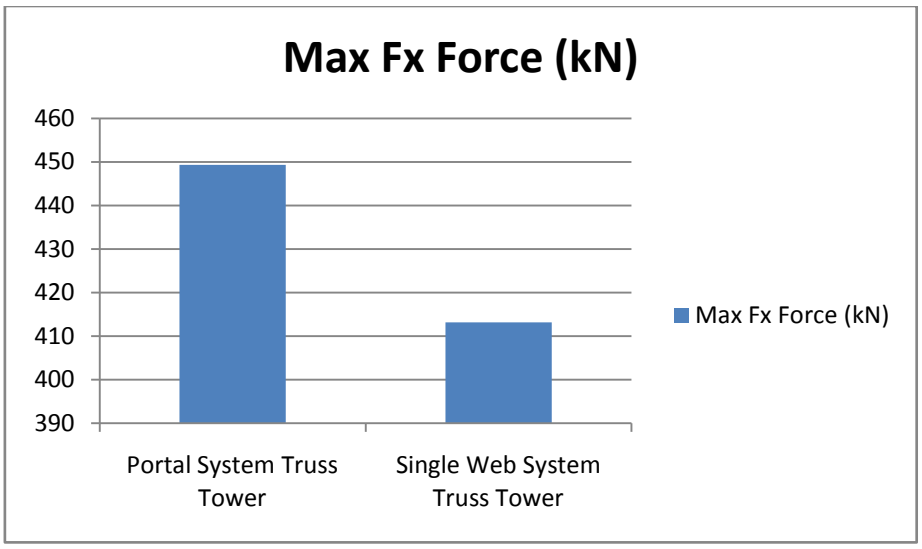


Fig. 7: Max. Force in X Direction

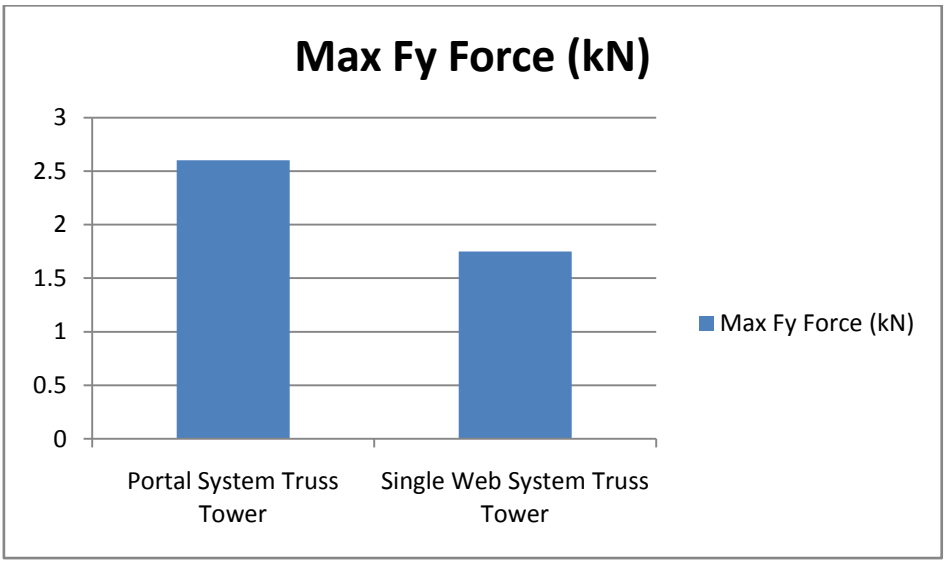


Fig. 8: Max. Force in Y Direction

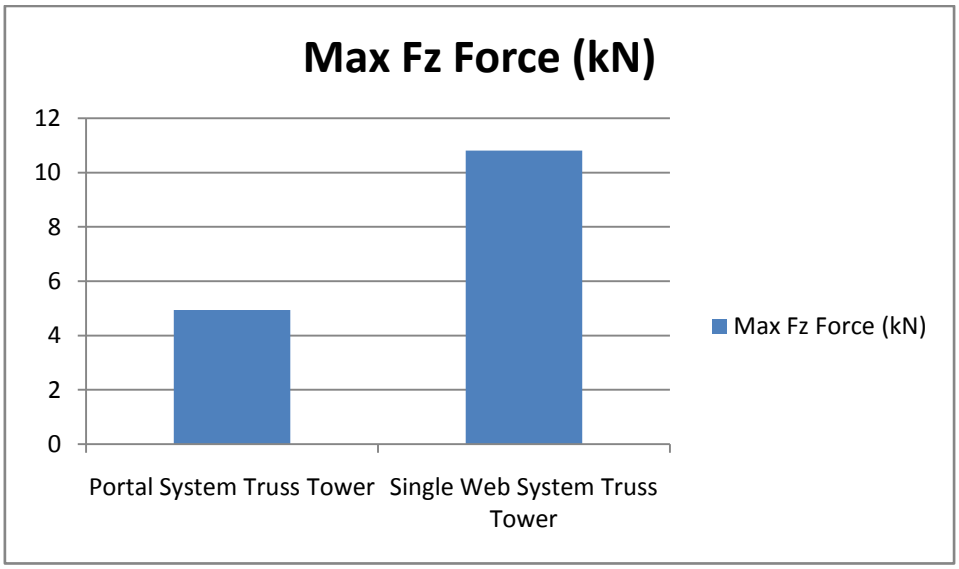


Fig. 9: Max. Force in Z Direction

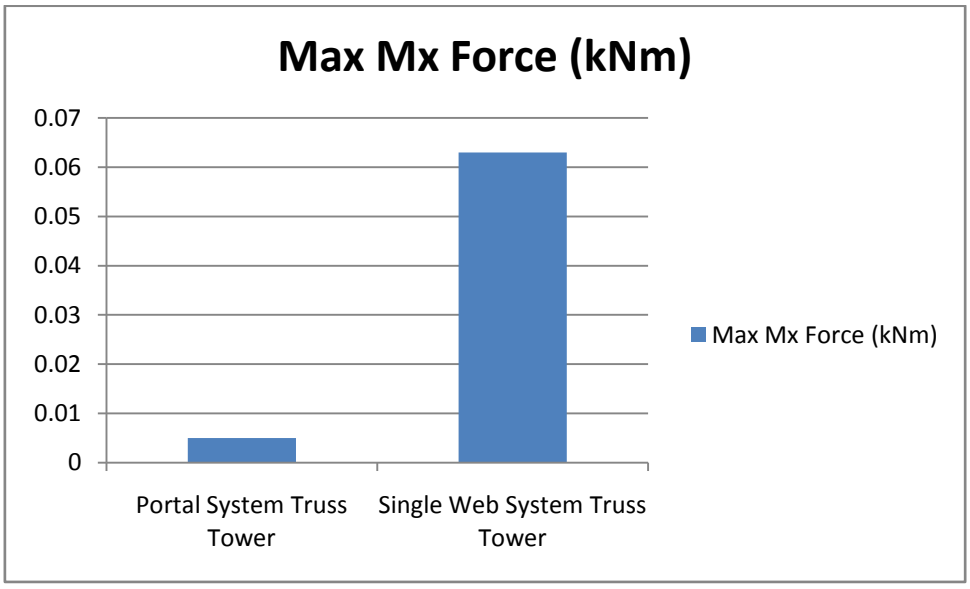


Fig. 10: Max. Bending Moment in X Direction

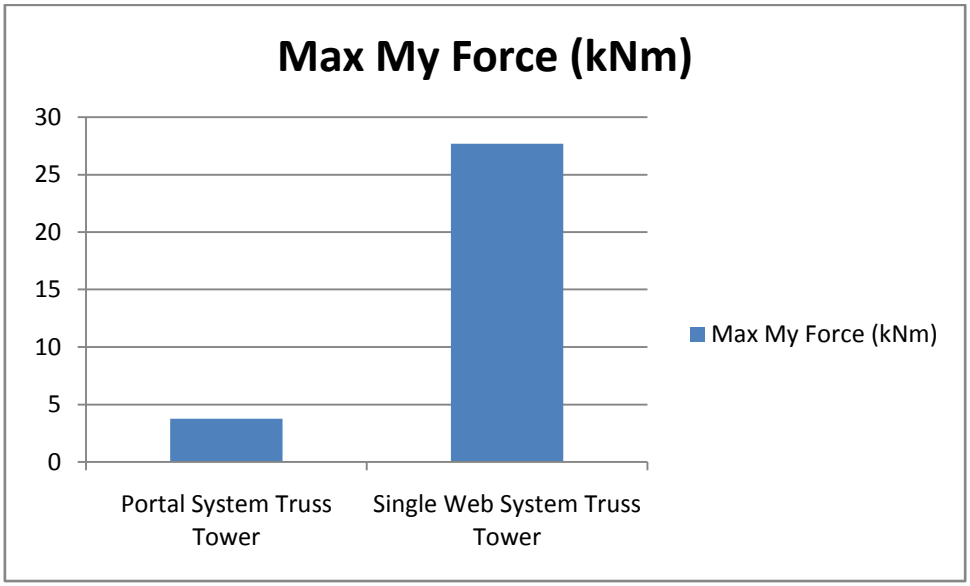


Fig. 11: Max. Bending Moment in Y Direction

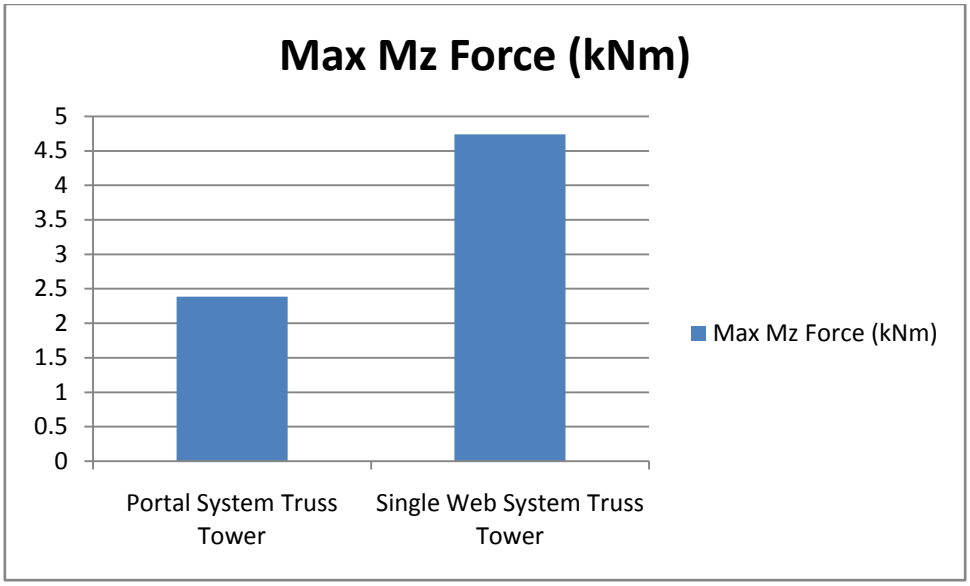


Fig. 12: Max. Bending Moment in Z Direction

V. CONCLUSION

- Portal Web System Truss Tower shows least bending moment in all conditions i.e. 0.005Kn-m, 3.762Kn-m, 2.387Kn-m in X, Y & Z directions in comparison to other truss systems.

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