square cutouts shows more von-mises stress than circular cutouts due to the presence of corners. The results show that von-mises stress increases with increase in cutout size.

As per FEMA 310 [10], the drift ratio of the steel moment frame shall be less than 0.015. Hence maximum drift limited to 51mm. Figure 10 shows the displacement versus variation in cutout size graph of steel plate shear wall with circular cutout and figure 11 shows the displacement versus variation in cutout size graph of steel plate shear wall with square cutout.

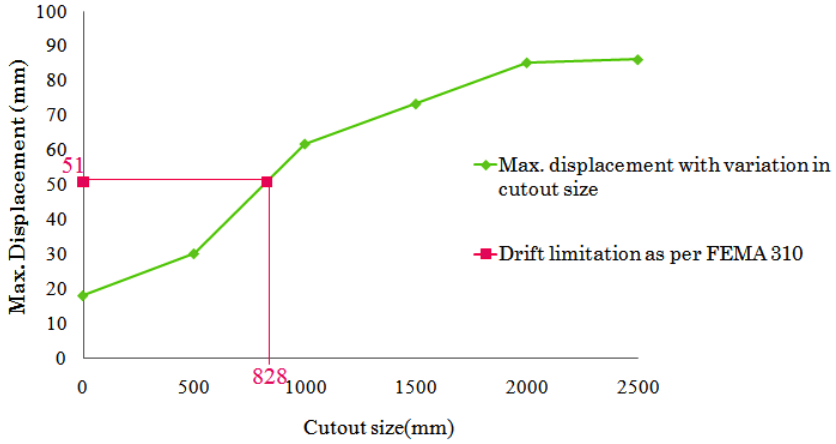

Figure 10: Displacement Vs cutout size graph of SPSW with circular cutout

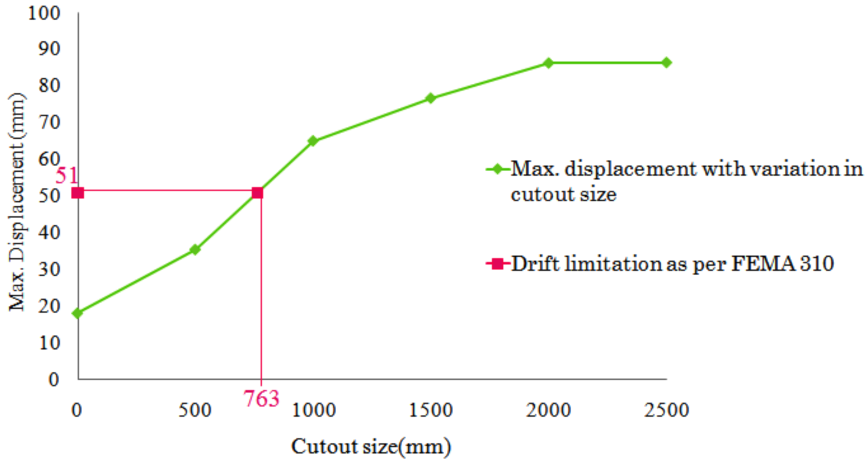

Figure 11: Displacement Vs cutout size graph of SPSW with square cutout

As per FEMA 310 [10], steel plate shear wall with circular cutout of diameter upto 828 mm are within in the safe drift limit and also steel plate shear wall with square cutout of size upto 763 mm are within in the safe limit .A cutout on infill plate beyond a limit leads the system to an unstable phase. As a remedial solution for 1000 and 1500 mm cutouts are located on infill plate of steel plate shear wall, two options can be adopted in order to overcome the difficulties, increasing thickness of infill plate and/or providing stiffeners to infill plate. In both cases system can be made withstand with the seismic requirements.

9. Conclusions

The steel plate shear wall system presented in the present study can be used as an effective lateral load resisting system in high seismic regions. A finite element model of the structure was subjected to the El Centro earthquake and was analysed using the non linear dynamic procedure. During this study a comparative analysis was performed on single storey steel frame with and without infill plate. A parametric study was conducted by considering variety of openings. This study leads to following conclusions:

- The model considered is validated with an experimental study from the journal, "Experimental Study of Diagonally Stiffened Steel Plate Shear Walls" by Erfan Alavi and Fariborz Nateghi.
- The displacement and von-mises stress of bare frame were decreased about 79% and 35% respectively by the use of steel infill plate. This is due to the increased stiffness of the steel plate shear wall compared to bare frame. Hence steel plate shear wall can be used effectively as a lateral load resisting system in the seismic regions.
- Based on the requirements of opening, variety of cutout be considered into steel infill plate and influence of these cutout on displacement and von-mises stress was studied.
- The steel plate shear wall with circular cutouts shows comparatively less displacement and von-mises stress than steel plate shear wall with square cutouts. Therefore steel plate shear wall with circular cutouts are more preferable than steel plate shear wall with square cutouts.

- The lateral load resisting capacity of steel plate shear wall reduces drastically when the cutout size in infill plate are increased beyond 2/3 rd of the panel depth and hence cutout size are not supposed to provide beyond 2/3rd of the panel depth.

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