Table 4: Results of Structural Analysis

Support condition	*Items*	*Displacement vector sum*	*Permissible load*	Stiffness
Effectively held in position at both ends but not restrained against rotation	ISWB 150	0.03189	161.2459	5056.3159
	ISWB 175	0.038319	298.9789	7802.3682
Effectively held in position at both ends and restrained against rotation at one end	ISWB 150	0.031890	233.5905439	7324.8838
	ISWB 175	0.038319	405.8402951	10591.098
Effectively held in position and restrained against rotation at both ends	ISWB 150	0.031890	310.393657	9733.2599
	ISWB 175	0.038319	490.2103832	12792.88

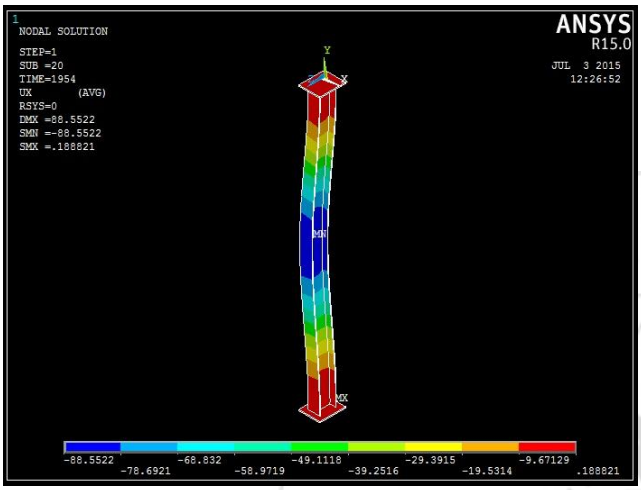

Figure 1 : Buckling pattern of ISWB 175

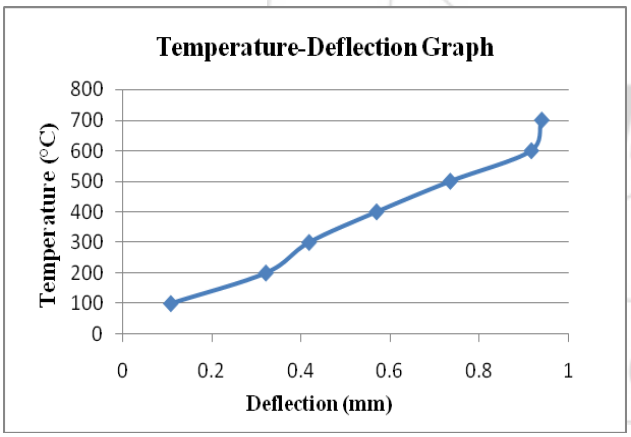

Figure 2 : Temperature-deflection graph of ISWB 150

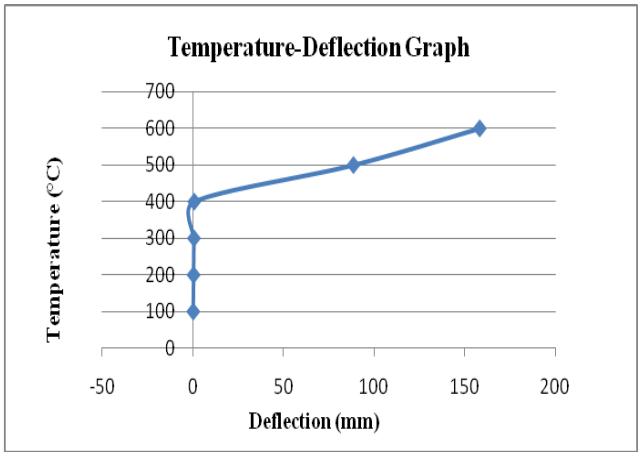

Figure 3 : Temperature-deflection graph of ISWB 175

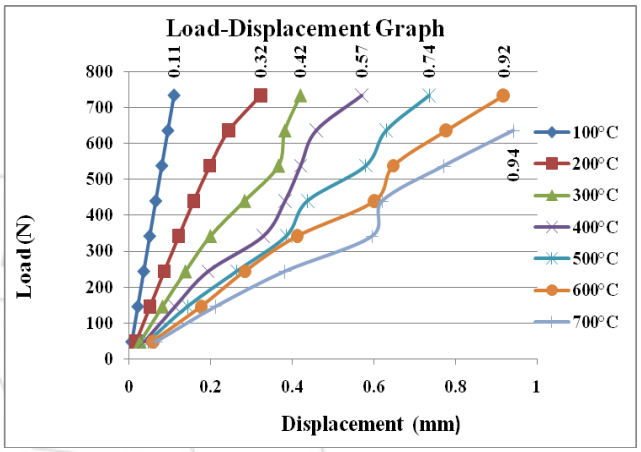

Figure 4 : Load – Displacement Graph of ISWB 150

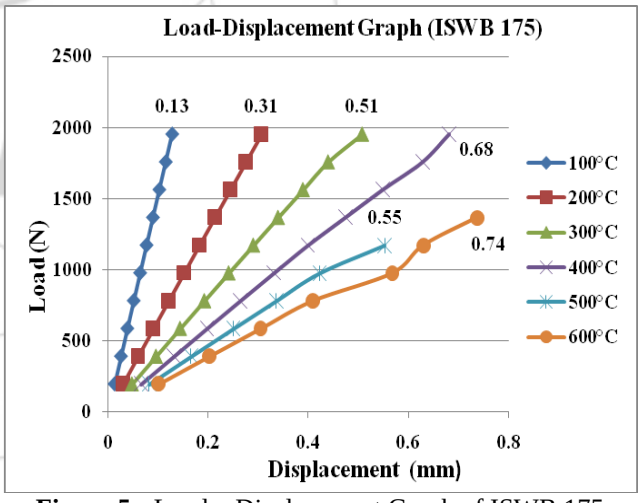

Figure 5 : Load – Displacement Graph of ISWB 175

From the coupled analysis it is clear that the column behaves as slender and buckle when the temperature increases. Figure 1 shows the buckling pattern of ISWB 175 in the temperature range 400 - 500°C. The temperature-deflection graph of ISWB 175 (Figure 3) show that it fails when the temperature increases beyond 500°C. But the temperature-deflection graph of ISWB 150 (Figure 2) show that it fails when the temperature increases just to 600°C. Figure 4 and 5 shows that the column section had a tendency to increase the deflection due to temperature increase, that it yield as the temperature increases. Here in this graph nadal loads are taken for the analysis.

As the permissible load for each section is different, but the behaviour pattern is same, it buckles at an elevated temperature range. Failure of each section occurs at different temperature range. As the cross section of the column increases, but the failure range of temperature decreases, it may due to increase in permissible load.

5. Conclusion

Failure behavior at elevated temperature is not understood under loading conditions, thus the finite element modeling gives its behavior that the short column may buckle along its weak axis due to axial loading with elevated temperature. Thus the property of short column changes as it buckles due to loading instead of crushing during elevated temperature situations. For an average loading and temperature condition most appropriate cross section to be having less cross sectional area with permissible loading condition. As the permissible loading decreases more will be the withstandable temperature limit.

Acknowledgment

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