

Title: Wind-moment design of semi-rigid un-braced steel frames using cruciform column (CCUB) section

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Abstract: The design of un-braced frames using wind-moment method (WMM) with cruciform column (CCUB) section as vertical member is presented here. Steel frames on a regular grid with approximately equal column spacings in the y-y and z-z direction using UC/UB sections has resulted in minor axis controlled the design, which leads to a significant loss in performance. The use of CCUB sections with equal I_y and I_z warrants an equal behaviour in both directions whilst ensuring that both the major and minor axis beam to column connections remain straightforward. The study has been conducted on 2-bay and 4-bay plane frames with 2, 4, 6 and 8 storey heights, and two different load cases are considered: minimum wind load in conjunction with maximum gravity load and vice versa. Structural design optimization of steel frames was conducted on the selection of steel sections for beam and column. The selection was carried out in such a way that the steel frame had the minimum weight while the performance of the structure was within the limitations described by BS EN 1993-1-1: 2005. Significant column weight savings (between 17–66%) was achieved by using CCUB section in the design, as compared to conventional UC sections.