

## Numerical Investigation of Cold Formed C-Section-Purlins with Different Opening Shapes

**Authors :** Mohamed M. El-heweity, Ahmed Shamel Fahmy, Mostafa Shawky, Ahmed Sherif

**Abstract :** Cold-formed steel (CFS) lipped channel sections are popular as load-bearing members in building structures. These sections are used in the construction industry because of their high strength-to-weight ratio, lightweight, quick production, and ease of construction, fabrication, transportation, and handling. When those cold formed sections with high slenderness ratios are subjected to compression bending, they do not reach failure when reaching their ultimate bending stress, however, they sustain much higher loads due stress re-distribution. Hence, there is a need to study the sectional nominal capacity of CFS lipped channel beams with different web openings subjected to pure bending and uniformly distributed loads. By using finite element (FE) simulations using ANSYS APDL for numerical analysis. The results were verified and compared to previous experimental results. Then a parametric study was conducted and validated FE model to investigate the effect of different openings shapes on their nominal capacities. The results have revealed that CFS sections with hexagonal openings and intermediate notch can resist higher nominal capacities when compared to other sectional openings.

**Keywords :** cold-formed steel, nominal capacity, finite element, lipped channel beam, numerical study, web opening

**Conference Title :** ICABCE 2022 : International Conference on Architecture, Building and Civil Engineering

**Conference Location :** Cairo, Egypt

**Conference Dates :** December 15-16, 2022