Analysis and Design of Tapered and Curved Haunched Connections

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Abstract

In this work, both tapered and curved haunched connections were studied. The general behavior was investigated to determine the flow of stresses and the performance of different connection components using the general purpose finite element program ANSYS. Both material nonlinearity and geometric imperfections were incorporated in the finite element analysis. The magnitude of geometric imperfections was based on the allowable limit stipulated by the Egyptian Code of practice. An extensive parametric analysis was conducted and design equations for the moment capacity for each type were proposed considering the different practical stiffeners configurations. For the tapered haunched connection, the effects of web slenderness, flange slenderness, haunch length to flange width and the slope of the haunch were investigated for three different stiffeners configurations. It was noticed that the location of the plastic zone as well as the optimum proportioning of the connection components differ from one configuration to another. For the curved haunched connection, the effects of web slenderness, compound flange slenderness and the bottom flange radius to haunch depth were evaluated for both un- stiffened and stiffened cases. Different stiffeners configuration were proposed. It was found that the failure mechanism depends heavily on the interaction between the different structural components sizes, but was primarily affected by the value of radial stresses and stiffeners thickness, length and spacing.

Keywords

Tapered haunches , Curved haunches , Geometric nonlinearity ,