Evaluation of Flange Bending Capacity near Member End Using a Finite Element Analysis Approach

Authors : Alicia Kamischke, Souhail Elhouar, Yasser Khodair
Abstract : The American Institute of Steel Construction (AISC) Specification (360-10) provides equations for calculating the capacity of a W-shaped steel member to resist concentrated forces applied to its flange. In the case of flange local bending, the capacity equations were primarily formulated for an interior point along the member, which is defined to be at a distance larger than ten flange thicknesses away from the member's end. When a concentrated load is applied within ten flange thicknesses from the member's end, AISC requires a fifty percent reduction to be applied to the flange bending capacity. This reduction, however, is not supported by any research. In this study, finite element modeling is used to investigate the actual reduction in capacity near the end of such a steel member. The results indicate that the AISC equation for flange local bending is quite conservative for forces applied at less than ten flange thicknesses from the member's end and a new equation is suggested for the evaluation of available flange local bending capacity within that distance.
Keywords : flange local bending, concentrated forces, column, flange capacity
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