

Robustness of Steel Beam to Column Moment Resisting Joints

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Abstract : Steel joints in building structures represent a weak link in the case of accidental transient loading. This type of loading can occur due to blast effects or impact with moving vehicles and will result in large deformations in the material as well as large rotations. This paper addresses the lack of experimental investigations into the response of moment resisting connections subjected to such loading. The current design philosophy was used to create test specimens with flush and extended end plates. The specimens were tested in a specially designed testing rig capable of delivering the sustained loading even beyond the point of failure. Types of failure that the authors attempted to obtain were bolt fracture, flange crushing and end plate fracture. Experimental data is presented, described and analyzed. The tests show that the strength and ductility can be significantly improved by replacing ordinary mild-steel bolts with their stainless steel equivalents. This minor modification is demonstrated to significantly improve the robustness when subjected to loading that results in high deformations and rotation, where loading is maintained during failure. Conclusions are drawn about the wider implications of this research and recommendations made on the direction of future research in this field.

Keywords : steel moment connections, high strain rates, dynamic loading, experimental testing

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